U. S. DEPARTMENT OF COMMERCE
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BUREAU OF FOREIGN AND DOMESTIC COMMERCE
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Industrial Series—No. 1

MODERN SHIP STOWAGE

Including Methods of Handling Cargo at Ocean Terminals

BY

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FOREWORD

Modern Ship Stowage is a comprehensive manual describing the basic principles of stowing sea-borne cargoes. It has been prepared to promote the safe carriage of American export and import goods, and supersedes Miscellaneous Series No. 92, Stowage of Ship Cargoes, issued by this Bureau some 20 years ago, when, as at present, the United States Merchant Marine was being rapidly expanded.

Since the publication of the earlier volume, there have been noteworthy developments in connection with the handling, stowage, and safe carriage of ocean cargoes. Many new types of equipment have been introduced to speed up loading and discharge, new types of vessels and improved cargo-handling facilities have been developed, the carriage of refrigerated cargoes has greatly increased, and new methods have been perfected to protect cargoes against marine-moisture damage—probably the greatest single cause of ocean-cargo losses and claims. The Bureau has received numerous requests for a new and up-to-date volume describing recent progress in these fields.

The literature on stowage is extremely limited; the need for information on the subject is increasing. The shipbuilding program of the United States Maritime Commission is modernizing the United States Merchant Marine and enlisting the services of many new officers and men. American vessels are entering new and unfamiliar trades and carrying commodities in connection with which the ships' officers require stowage information which will enable them to prevent damage. Strategic materials needed for defense must be stowed and transported with expert care so that they will be landed in condition for immediate use. Temporary shortage of ocean-shipping space at this time intensifies the need for data on stowage factors which will assist those in charge to fill their vessels to maximum capacity.

The Bureau acknowledges the assistance of various steamship companies which provided information on their methods of loading, stowing, and discharging various cargoes and furnished stowage factors for commodities carried in their particular trades. Acknowledgment is also made for the material and suggestions provided by the manufacturers of cargo-handling equipment and installations for marine-moisture control, and to Captain I. M. Holt, Marine Superintendent of the United States Maritime Commission, and Captain Thomas Blau, of the Grace Line, for their careful reading of the manuscript and the many suggestions they were able to give as a result of their long experience as shipmasters. The present volume has been prepared in the Division of Industrial Economy by Joseph Leeming, with the assistance of Miss Josephine Flaherty, reviewed by A. E. Sanderson, under the general supervision of Thomas E. Lyons.

It is believed that this handbook will be helpful to steamship operators and their staffs, to ships' officers and deck personnel, and to exporters and importers, for all of whom it provides information on

present-day cargo-handling and stowage methods and suggestions for the safer handling and carriage of the many commodities that move in international trade.

As this work was prepared prior to the national emergency and the declaration of war, the attention of the reader is invited to statutory authority, executive orders, emergency regulations, and other temporary war-time measures which may have an effect upon the procedures set forth herein. During the emergency the Bureau of Foreign and Domestic Commerce offers its facilities to assist readers in keeping informed of new regulations.

CARROLL L. WILSON, *Director*,
Bureau of Foreign and Domestic Commerce.

SEPTEMBER 1941.

NOTE

The use of trade names throughout this text is to secure accurate descriptions indicating important stowage factors. The use of such trade names does not in any sense indicate recommendation of, or sponsorship for, the trade-marked articles so mentioned.

MODERN SHIP STOWAGE

CHAPTER I

RECEIPT AND HANDLING OF CARGO AT OCEAN TERMINAL

Stowage is the art of placing cargo in a vessel for transportation by water. That the ability to stow goods skillfully and properly is an art, which is generally acquired only after a considerable period of experience with many types of cargo, will readily be attested by anyone who, afloat or ashore, has had intimate contact with the operation of ocean-going vessels. Those in charge of stowing a ship must take a number of factors into account. These include stowage of the cargo so the vessel will carry the maximum volume and weight under prevailing circumstances; stowage to prevent damage to the cargo; stowage to prevent injury or danger to the ship or the ship's crew; and stowage that will permit the cargo to be unloaded with the least possible delay at the port or ports of discharge. These, and numerous other related factors, are discussed in detail in the following pages.

RESPONSIBILITY FOR PROPER STOWAGE

The responsibilities and liabilities of the shipowner with respect to the handling, loading, and stowage of cargo are defined primarily in the Carriage of Goods by Sea Act, 1936, and the Harter Act of 1893. (See appendix, page 430.)

The Harter Act (section 3) provides that if a shipowner has exercised due diligence to make his vessel "in all respects seaworthy and properly manned, equipped, and supplied," neither the vessel, its owners, agents, or charterers shall be held responsible for damage or loss resulting from faults or errors in navigation or in the management of the vessel. At the same time, the Act states that any clauses inserted in bills of lading or shipping documents relieving the shipowner, manager, agent, or master from liability for loss or damage "arising from negligence, fault, or failure in proper loading, stowage, custody, care, or proper delivery" of cargo shall be null and void and of no effect. Thus, one of the principal purposes of the Harter Act was to prevent shipowners from evading their obligation properly to load, stow, care for, and deliver cargo carried on their vessels.

With a view toward developing uniformity of the rules governing the obligations and liabilities of shipowners under a bill of lading, a code of rules was drawn up by the Maritime Law Committee of the International Law Association in 1921. These rules, known as the "Hague Rules," established technically the liabilities and rights of shippers and ocean carriers. They were reissued with some amendments in 1922, and were then placed before the International Confer-

ence on Maritime Law, at Brussels, in 1922. The delegates at the Conference unanimously recommended the adoption of a draft convention embodying the Hague Rules as the basis of a convention between the participating countries. In accordance with these recommendations, the rules have been given statutory force with certain amendments in various countries, and form the basis of the Carriage of Goods by Sea Acts of Great Britain and the United States.

It may be noted that the United States Carriage of Goods by Sea Act, 936 (sec. 12), states that: "Nothing in this act shall be construed as superseding any part of" the Harter Act, "or of any other law which would be applicable in the absence of this act, insofar as they relate to the duties, responsibilities, and liabilities of the ship or carrier prior to the time the goods are loaded on or after the time they are discharged from the ship."

The Carriage of Goods by Sea Act, 936, provides that: "The carrier shall properly and carefully load, handle, stow, carry, keep, care for, and discharge the goods carried." According to the preamble of the act: "Every bill of lading or similar document of title which is evidence of a contract for the carriage of goods by sea to or from ports of the United States, in foreign trade, shall have effect subject to the provisions of this act." In other words, the act was originally designed to apply to vessels in foreign trade only. It is permissive, however, for coastwise and intercoastal carriers to incorporate the provisions of the act in their bills of lading and in actual practice this usually done. (See sec. 13 of the act, which is quoted in full in the appendix.)

It is clear, from the foregoing, that responsibility for proper stowage rests primarily upon the shipowner and on the master as his representative. This is the case, unless there is an agreement to the contrary. Such agreements are permissible in the case of private carriers. Also, in the case of common carriers, the Carriage of Goods by Sea Act, 1936 (sec. 6), states that:

> A carrier, master or agent of the carrier, and a shipper shall, in regard to any particular goods be at liberty to enter into any agreement in any terms as to the responsibility and liability of the carrier for such goods, and as to the rights and immunities of the carrier in respect of such goods, or his obligation as to seaworthiness (so far as the stipulation regarding seaworthiness is not contrary to public policy), or the care or diligence of his servants or agents in regard to the loading, handling, stowage, carriage, custody, care, and discharge of the goods carried by sea: *Provided*, That in this case no bill of lading has been or shall be issued and that the terms agreed shall be embodied in a receipt which shall be a nonnegotiable document and shall be marked as such.

A private carrier is, in general, a vessel that is chartered for a special cargo or voyage or to a special person or company, as, for example, a tramp vessel chartered to carry a full cargo of coal or grain. A common carrier, on the other hand, "is one who undertakes for hire to transport the goods of those who may choose to employ him from place to place. He is in general bound to take the goods of all who offer" (Liverpool & G. W. S. Co. *vs.* Phenix Ins. Co. (The Montana), 129 U. S. 437, 9 Sup. Ct. 469, 32 L. Ed. 788), as, for example, regular liners or "any ship that carries on business for all, and by advertisement or habit carries goods for all alike" (21 How. 22, 16 L. Ed. 41).

SHIPOWNERS' RESPONSIBILITIES IN LOADING, HANDLING, AND STOWAGE OF CARGO

The responsibilities of the shipowner in connection with the loading, handling, and stowage of cargo, as summarized in Corpus Juris, volume 58 (The American Law Book Co., New York; 1932), which gives a statement of the law as embodied in and developed by all important decisions, are quoted below.

IMPROPER LOADING OR HANDLING

The carrier, in the absence of contractual or statutory exemption, is liable for an injury to cargo resulting from improper or negligent handling in loading. Since the loading of the cargo is a duty which the shipowner is bound to perform as a part of the contract of carriage, it is immaterial to the shipper whether the duty is performed through the general employees of the shipowner or through an independent contractor.

IMPROPER STOWAGE

In general.—The carrier is liable for injury occasioned by defective stowage, in the absence of a contractual or statutory provision to the contrary, and bad stowage may constitute negligence precluding the carrier from relying on exceptions from liability contained in the bill of lading, but although badly stowed, if the carrier can show that damage to the goods must have happened anyhow, so that the bad stowing is not the proximate cause of the loss, he is not liable. It is not sufficient, however, to exonerate the carrier that the loss might have otherwise occurred. The law imposes upon the carrier the duty of using due care to ascertain and consider the nature and characteristics of goods offered for shipment and to exercise due care in their handling, and further, the carrier is charged with notice of any patent defect in the goods. A carrier who accepts goods of a nature which require special care in their stowage must exercise such care. Further, where the season of shipment increases the danger, increased caution in stowage is required, and when the voyage is one on which severe and stormy weather is to be anticipated, care in securing the cargo against shifting under stress of weather is required. A custom of stowing cargo in a particular part of a vessel will not justify stowing more cargo there than all of the conditions in relation to the physical surroundings warrant.

Held not to constitute bad or negligent stowage.—(1) Cargo of oil in bridge deck space. (2) Caustic soda in iron drums with iron cotton ties. (3) Cocoanut between decks, over dry cargo in the hold, provided the decks are permanently laid, in thorough order, well calked and tight, and provided with sufficient scuppers for the escape of leaking oil. (4) Hides beneath sugar stowed on a perfectly tight iron between decks. (5) Oil in casks on the main deck of a steam propeller, bulwarked entirely around and covered by the upper deck, and constructed specially for the purpose of carrying cargo, so that the cargo placed there is as completely protected from the weather and from storms as if it were in the hold. (6) Quebracho extract between decks from Buenos Aires to Boston held not negligent. (7) Sugar in bags. (8) Glycerin in drums between decks. (9) Under the stringer of an iron ship, in the between decks, is a proper place for the stowage of skins when so dunnaged as to be fully protected from the moisture on the sides of the ship.

Held to constitute bad or negligent stowage.—(1) Barrels of olives stowed so that bungs were not upright. (2) Cabbages in the between decks of a steamship, injured by heat from steam pipes. (3) Cocoanut oil stowed in single-riveted slack tank. (4) Crated onions not blocked to prevent shifting. (5) Crated onions not properly shored. (6) Piling barrels of olives bilge and bilge, when they should have been turned bilge and cantline. (7) Placing cargo of such weight on top of casks of olives as to flatten the staves of some, causing the brine to leak out. (8) Fish meal stowed in lower hold without ventilation. (9) Placing malt in same cargo space with drums of kerosene oil. (10) Stowing cargo of oil in cross-bunker, separated from fire room by steel bulkhead. (11) Stowing of shellac, which is easily stained, in a compartment which had recently contained coal, and from which the coal dust

had been removed by sweeping only, without washing. (12) Wet rags in same compartment with rabbitskins.

Cargo stowed by stevedore.—The ship and its owners are exempt from liability for damages resulting from bad stowage performed by stevedores selected by the owner of the cargo, even if paid by the carrier; but this rule does not exempt ship and its owners from liability for a failure in their duty as a carrier after the stowage has been performed, nor does the mere right upon the part of the cargo owner to select the stevedore exempt the ship from liability for bad stowage where the master is not deprived of his authority to control the loading and to insist upon stowage satisfactory to him; so, although the stevedore is appointed by the shipper, if the contract of af-freightment provides that the master shall direct the stevedore and the carrier be liable for the stowage, the carrier will be responsible for improper stowage. As the master designates the place within the ship where each kind of cargo is to go, when such place is improper the ship is liable for consequent damages to the cargo, although it was stowed by another stevedore. Where goods are stowed in the customary way, and according to the best judgment of experienced stevedores, the fact that if they had been stowed differently the injury sustained might have been avoided does not make the carrier liable, as he is not required to take such extraordinary precautions.

Degree of care required.—A ship is bound to the exercise of reasonable care and skill only in the stowage of cargo, and to render her liable for damage to cargo on the ground that she was unseaworthy by reason of improper stowage, it must be shown that the manner of stowage was such as would not have been approved at the time by a stevedore or master of ordinary skill and judgment, knowing the voyage to be made and the weather and sea conditions which the vessel might reasonably be expected to encounter. (The Musselcrag, 125 Fed. 786.)

Injury to cargo from other cargo.—Different parts of the cargo must be so stowed as not unnecessarily to injure one another; and a vessel is liable for damages caused to goods of one shipper by those of another, although the goods are stowed in the usual way, if the injury is caused by the goods of the third party being in bad condition when put on board, or of such a nature as naturally to cause damage; and where the vessel carries different kinds of cargo, which are liable to damage each other, special care must be taken that they be so stowed that damage shall not result, and with as much skill as a competent stevedore could show; and where the different parts of the cargo are such as are very probable to injure each other, the carrier is liable, although they be well stowed, if injury result, without proof of any wilful or negligent default on his part; but the carrier is not responsible for injury necessarily resulting to the goods of one shipper, from their being carried in the same vessel with the goods of other shippers, which, by usage, are a proper part of the same general cargo, unless such injury could have been avoided by the exercise of reasonable skill and attention on the part of the persons employed in the conveyance of the goods.

Stowage on deck.—The owner of a vessel is not liable for the loss by sea perils of goods loaded on the deck with the consent of the shipper when no culpable neglect or misconduct is attributed to him in their destruction or jettison. However, where goods are shipped under a clean bill of lading the presumption in that the goods are to be put under deck, there being no positive agreement to the contrary, or circumstances from which it might be inferred; and stowage on deck without consent of the shipper renders the carrier liable for loss resulting therefrom, even as against damages of the sea, and notwithstanding exceptions in the bill of lading, unless they would have been equally fatal if the goods had been under deck; but as silence in a bill of lading as to stowage is not an express contract upon that point, the shipowner may prove an agreement to carry on deck, where a claim for loss is made, or usage to that effect; and a shipper who agrees that his goods shall be carried on deck, and assents to the manner of stowing and protecting them, cannot recover for an injury through natural causes where all reasonable care was taken of them during the voyage.

A vessel is not liable for loss or damage to a cargo by reason of its having been stowed on deck, if it must have been contemplated from the nature of the cargo that it should be so stowed; but even though a cargo was of such character as to be properly stowed on the deck, the vessel is liable for damages caused by its being insufficiently secured, or covered, or because of the improper loading of the vessel, or for an unnecessary jettison.

Taking a full price for stowing on deck will subject the owner of the vessel to damages, if the freight placed on deck is thereby lost or damaged; but any inference that the cargo may be carried on deck, implied by a reference in the contract to the capacity of the vessel, is repelled by the fact that the shipper refused to insert leave to carry on deck in the bills of lading proposed to be signed, and paid under deck freight; and a shipper who sees goods deck-stowed without objection cannot claim damages for injury to them occurring without fault of the carrier.

Dunnage.—Lack of sufficient dunnage to protect cargo is bad stowage, for which the vessel is liable, and a ship must be dunnaged so as to protect the cargo even in rough weather, if the vessel springs no serious leak; but if the vessel has met with extraordinary sea peril upon proof of usual good dunnage the carrier will not be liable.

SATISFACTORY PACKING REQUIRED OF SHIPPERS

According to a ruling handed down by the United States Circuit Court of Appeals (2d Judicial Circuit) in March 1940, neither a vessel nor its operator can be held liable if goods offered for shipment are not cased or wrapped in a manner to withstand the ordinary hazards of an ocean voyage, always providing that such cargo has been stowed with usual care in accordance with the prevailing practice. The suit was prosecuted as a test case to determine the degree of liability arising in similar cases.

The suit involved two shipments, totaling 269 bales of ribbed smoked sheet rubber from Banjermasin, Borneo, transshipped at Sourabaya, Java, and delivered at New York in July 1937. The plaintiffs charged receipt of the rubber "seriously damaged and impaired in value by being crushed, dented, and misshapen." Improper stowage of the baled rubber in tiers was claimed by the plaintiffs to have caused the crushing and imbedding of metal bands into the material. The denting and misshaping of 229 bales reduced the value by one-fourth cent per pound, it was argued, although the quality of the rubber was not impaired.

On behalf of the plaintiffs, the crushing was admitted, but the testimony of experts was offered in the lower court to establish that the rubber was stowed in the usual manner. It was brought out that the slicing machines for handling the bales are capable of adjustment to handle various sizes and shapes. It was established also that until recent years crude rubber was shipped in cases, but since the decline in market price, shippers have resorted to the cheaper method of using metal bands, covered with burlap, to hold the compressed rubber.

In writing the Appellate Court's affirmative opinion, Judge Learned Hand stated:

> In the carriage of goods the trade must always come to some accommodation between ideal perfection of stowage and entire disregard of the safety of the goods; when it has done so, that becomes the standard for that kind of goods. Ordinarily it will not certainly prevent any damage, and both sides know that the goods will be somewhat exposed; but if the shipper wishes more, he must provide for it particularly.

After noting that standards usually are written into shipping contracts and that the shipper, in the case at issue, did not seek to avoid loss by casing instead of baling, Judge Hand found it was not proved that handling of the consignment was careless. The damages arose from insufficiently covering plastic goods which cannot be conveniently stowed in any other way than as the trade stows.

IMPORTANCE OF WORK DONE BY DOCK FORCE

The methods employed in receiving and handling cargo at the ocean terminal are of the utmost importance to the ocean steamship operator and, under normal conditions, may play a large part in determining whether or not his ships operate at a profit. To the shipper, the handling of cargo on the dock and during the loading and stowing operations is also of importance. If the dock force is well trained and the equipment used in transferring goods on the dock is of the proper kind, there is less likelihood of damage occurring during this stage of the export voyage.

In this section, the term "dock force" will be used to include all the workers involved in the receiving, loading, and stowing of a vessel, and should be understood in that manner. The dock force will under this definition include the port captain or dock superintendent and his staff of receiving clerks, checking clerks, the stevedoring organization, and also the master and officers of the vessel.

In actual practice, these groups usually work in close cooperation in connection with all loading and stowing operations, though there are some differences as between different trades. In some North Atlantic services, for example, the loading is often very simple, the ship taking cargo at only one port and discharging at one port, although in many instances in this trade there are three or four loading ports and an even larger number of discharging ports. In this trade the second officer, who is usually the cargo officer, works with the dock superintendent and the chief stevedore, and these three are sufficient to oversee the work, keep track of the location of cargo in the ship, and so on.

In other trades, such as those to the Far East, Central America, West Indies, West Africa, and east and west coasts of South America, the vessel may frequently call at from 6 to 18 ports, and will load and discharge cargo at every port. In such trades it is necessary to plan and watch the stowage with the utmost care, so that conditions at every port of call will permit the rapid discharge of cargo for that port and loading of cargo that is to be taken on board, without blocking off other cargo or interfering with the stability of the ship. Usually, in these trades, the loading is done under the close supervision of the master and the ship's officers, as they are the individuals who will be responsible for the quick dispatch of the ship at each port on its itinerary, and, as a consequence, must have an exact knowledge of where and how each and every consignment is stowed.

The efficiency of the dock force, including the stevedoring organization and the ship's officers, and the care with which their work is planned and carried out, determines in large measure the number of days and hours a ship remains in port discharging inbound cargo and loading outward cargo. For successful operation the ship's time in port, or its turn-around, must be as brief as possible. This is partly because all the major items of expense, with the single important exception of fuel, continue day in and day out whether the ship is at sea or in port. The crew's wages, the officers' salaries, and subsistence for the ship's company represent major operating expenses that must be paid for every day. Other items of expense while the ship is in port include the fuel required to operate the winches, dynamos, and other machinery on board, and to keep the ship heated in winter.

In addition, the overhead charges of insurance, interest on capital, and depreciation ordinarily amount to a considerable sum per day. Each day unnecessarily spent in port means, therefore, an outlay of money with no compensating income from freight moneys. The earning capacity of a ship depends largely on the rapidity of its turn-around or the number of voyages it can make in a year, and the turn-around can be increased to a large extent only by preventing delay in port.

In view of the above, the importance of the work done by the dock force may be adequately realized. If the work of the dock force is intelligently planned and efficiently executed, the ship's stay in port is reduced to the minimum possible number of days and hours, and the number of days during which the ship can be on the move carrying paying cargo is correspondingly increased. It has been said, and with a considerable measure of truth, that there is no single point in the entire field of ship operation where efficiency of organization and management is so important in spelling profit or loss as in the work of the dock force in receiving, handling, loading, and stowing the company's ships.

In addition to handling cargo intelligently and rapidly so as to eliminate all unnecessary delays in discharging and loading, the dock force must be trained to handle cargo skillfully and with care so it will not be damaged during the time it is on the dock or during transfer to the vessel alongside. Damage claims payable by the shipowner or operator owing to negligence on the part of his employees can amount to large sums during the course of a year. In addition, a steamship line which is known to have an inordinate amount of damaged cargo is hurt by this fact and may lose business because of it.

In this connection it might be added that careful handling of cargo on the part of American ship operators can do a very great deal toward winning favor for American-flag ocean-going vessels. In the past there have been many complaints concerning alleged carelessness in handling and stowing cargo by ship operators. Some of these complaints have been unwarranted; but others have doubtless been justified. Study of the amount of damage done to cargo and development of methods by which such damage may be reduced are matters that might well be given the most careful consideration. A number of the American steamship companies have already carried out noteworthy studies of this nature and have produced extremely worthwhile results. It should also be added that damage to cargo during handling on the dock and loading aboard ship is not an occurrence confined solely to American steamship lines. Foreign-owned companies experience the same trials and tribulations in this phase of their operations.

TYPES OF OCEAN TERMINALS

In most United States ports the pier type of ocean terminal predominates. This is a structure projected into the water at a right angle to the shore line. Berthing places that are technically known as docks or wharves, which are structures built along the shore line, are not so common in the United States as in many foreign ports, although well-appointed wharves are found in a number of United States ports, for example, New Orleans, Savannah, and Portland, Oreg. Insofar

as the handling of general cargo is concerned, the differences between the two types of terminal are not particularly significant, and in the present volume the terms "dock," "wharf," and "pier" are used interchangeably, this being in accordance with the general practice existing on the waterfront.

The ease or difficulty with which cargo can be assembled and loaded depends much more upon the size of the terminal, the method of construction, and the width of the "apron," than upon whether the terminal is a wharf or a pier. The apron is the open section of the pier, between the covered shed and the edge of the pier alongside which the ships are moored. From the point of view of cargo handling, the apron may be defined as that portion of the pier from which cargo is lifted when a ship is being loaded, or where cargo is first landed from a ship that is being discharged.

Many of the piers in United States ports are old and relatively small. Their sheds are low and narrow and on many of them there is almost no apron between the shed and the ship's side. Cargo-handling on these piers is likely to be a difficult matter. Congestion may occur a short time after the discharging of inward cargo begins, and, consequently, every effort must be made to have the consignees pick up their cargo as soon as possible so the dock can be kept reasonably clear and space be made for the outward cargo that is to be loaded as soon as discharge is completed.

In contrast to these piers there are, in many of our ports today, a considerable number of well-constructed piers, with large sheds and wide aprons, and equipped with all the necessary facilities for loading and discharging the cargoes that are most commonly handled at the particular port or pier. In most instances the aprons of these modern piers are provided with one or two car tracks, which make it possible to bring railroad cars directly alongside the ship and thus handle cargo directly from the cars into the ship, or from ship to cars. Obviously, this eliminates a good deal of handling and helps to keep the dock clear of cargo.

The size and construction of the dock or pier have a great deal to do with the ease with which the proper placing or assembly of the cargo can be carried out, and with which the later transfer to the pick-up place can be made. If the pier is small or narrow, it is often extremely difficult to place properly a cargo intended for a ship of any size. If such a pier must be used, it may be necessary to devote much more than usual attention to timing the delivery of the cargo. Permits must be carefully issued and a close check will need to be kept on shippers to get them to deliver their shipments to the dock at the time they are needed.

Even when the greatest care is exercised in timing deliveries, difficulties are likely to arise, and it may be necessary to pile cargo high in the air or to move some shipments for long distances lengthwise of the pier, simply because there is not sufficient space to enable the different consignments to be placed opposite the holds of the ship into which they are to be loaded. Under such conditions the use of power-operated trucks for horizontal transfer and for piling or stacking is frequently of great value in keeping the cargo moving to the pick-up point beneath the ship's hook, thus preventing costly delays.

Other piers, which in some cases increase the difficulty of handling cargo rapidly and with minimum expenditure of time and labor, are

those which have solid side-wall construction with more or less widely separated doors through which cargo can be carried to the apron. For some vessels the doors may be properly spaced so that cargo can be easily moved to points directly opposite the holds into which it is to be loaded. For other ships, however, the walls may be so placed as to block off access to points on the apron opposite some of the ship's holds. When this is the case, it is often necessary to shift the vessel ahead or astern several times during loading, or else to truck the cargo an inordinately long distance. This condition does not exist on most modern piers which are usually constructed so that any part of the side wall can be lifted to form a doorway.

On some piers, even those constructed in recent years, large stringpieces have been provided and these, combined with very narrow aprons, interfere with the cargo-handling operations because the slingloads have to be made up inside the shed. This makes it impossible to discharge directly to the deck of the terminal or to hoist the slingload vertically to clear the ship's rail. Instead, the load has to be swung into the shed by manpower, or in loading the slingload has to be held by the longshoremen while it is being hoisted, to keep it from striking the side of the ship. This extra work and care slows down the entire operation. At some of these piers the difficulty has been eliminated by cutting out sections of the stringpiece opposite the shed doors and providing portable platforms extending over the edge of the pier on which slingloads can be handled.

A landing platform for the second floor is advisable on double-deck piers for the same reason that wide aprons are desirable on the first deck. Slingloads can be handled with less delay. This provision has been made at some terminals by running out a platform far enough to receive the slingload. At the Western Maryland Terminal in Baltimore, the shed wall of the upper deck is set back to provide a platform 10½ feet wide, which furnishes ample space for handling the drafts of cargo. The refrigerated terminal at China Basin, San Francisco, has a movable platform which runs along the apron at the level of the second floor. A rail is provided on the apron near the stringpiece and another rail on the second floor to carry the wheels on which the platform moves.

FACILITIES FOR LOADING MOTORTRUCKS

Many terminals are not provided with adequate facilities for the prompt loading and unloading of motortrucks, with the result that there are many delays and a good deal of unnecessary confusion and congestion. A solution of this difficulty, which has proved very beneficial, according to one authority,[1] "is to provide a platform at the street end of a pier or the street side of a quay type terminal, at which trucks with small loads can be handled. When a ship is working cargo, shippers' trucks delivering cargo on a pier are a serious obstacle to safe and economical operation. In many cases, the loads of most of the motortrucks are small and it is possible to keep them off the piers without any great difficulty. One steamship company

[1] Stocker, Harry E., Assistant Professor of Transportation, New York University. Materials Handling Methods at Ports and Terminals. A paper read before the annual meeting of the American Society of Mechanical Engineers, New York, December 4, 1940.

found that 75 percent of the trucks handled only 25 percent of the cargo. Receiving on the wharf at the head of the slip kept practically all 75 percent of the trucks off the narrow, congested pier."

On some piers white lines are marked on the flooring to indicate the lanes to be used by trucks, and the points where trucks are to turn around are also marked. This simple device keeps the truck lanes clear of cargo and contributes materially to reducing confusion and congestion on the pier.

ESTIMATING FOR CARGO TO ARRIVE

Each day it is customary on most piers not only to report the cargo on hand on the dock and alongside in lighters but also to measure the ship to determine the weight and measurement of the cargo needed to fill the remaining space and put the ship down to its marks. The weight to go is figured from the draft of the ship and its immersion scale. For example, if it is known from the immersion scale that the ship goes down 1 inch for every 42 tons loaded, by taking the draft it is found that there remains 3 feet 5 inches to go (3 feet 5 inches equals $41 \times 42 = 1{,}722$ tons). The ship, however, may still have 200 tons of coal and 100 tons of water to take aboard, so 300 tons must be subtracted from 1,722, leaving 1,422 tons of cargo to go. Assuming that the net space remaining in the ship is 80,000 cubic feet, it will require cargo stowing, on the average, 56 feet per ton to put the ship down and fill it, since 1,422 tons weight, which stows 56 feet per ton, will take up, say, 80,000 cubic feet of space in the hold. Such estimates are made as required, sometimes several times a day.

RECEIVING CARGO AT THE DOCK

The dock is the scene of the most intense activity when ships are being discharged and loaded in quick succession. Proper handling of the thousands of cases, bales, barrels, and other containers that are landed on the dock from incoming ships and brought to the dock by trucks, drays, lighters, and railway cars calls for careful planning, cool judgment, and quick thinking. The atmosphere of the dock during active periods and some of the activities that require constant watching and control are well described by Annin,[2] as follows:

> When there is anything at all doing, there are no dull times on the dock. If it has no troubles of its own for the moment, it can trust the office to lend it some. All the physical and mechanical grief and sorrow of loading and discharging show up at the wharf end. It is here that the economy of speed and the waste of delay is most apparent. When things go wrong, the first action of the office is to "call up the dock." The cargo must come in proper rotation—heavy cargo first, light cargo later, and other merchandise to fit the needs of stowage. The condition of packages; the exclusion of unpermitted shipments; the rejection of dangerous or unfit cargo; the prompt receipt of lightered goods, lest lighters claim demurrage; the measuring and remeasuring of room left in the ship, that the office may know whether too little, too much, or just enough has been engaged; watching the draft, that the vessel may be neither deep nor light; watching the trim, that she may have just the right drag for her best speed; smoothing down impatient or indignant shippers; spurring dilatory ones to get their cargo alongside; . . . all these and many more troubles are indigenous to the dock and must be handled by the dock clerk

[2] Annin, Robert E. Ocean Shipping. The Century Co., New York, 1920.

or marine superintendent. The details of stowage are for the stevedore, broadly overlooked by the dock superintendent.

The principal functions of the dock force proper, as distinct from the stevedoring organization, are:

1. To receive and receipt for the cargo engaged and delivered at the dock.
2. To reject cargo that has not been engaged or that is not fit for shipment. This may refer to goods not adequately packed or, because of their dangerous character, are not permitted to be carried.
3. To keep the necessary records showing number of packages, measurement, weight, condition, and any other details needed for the preparation of bills of lading.
4. To keep the office continually informed as to the progress being made and of happenings or changes of conditions that may necessitate a change of plans in connection with the engagement or delivery of freight, the stowage of the ship, etc.
5. To oversee the stowage of the ship, particularly with reference to protecting the ship owner's or operator's interests and to protect the latter against claims that may properly be caused by negligence on the part of the stevedore or his employees.

Each shipper, when he engages space for his shipment on a certain vessel, is given a "shipping permit" by the steamship company. This form is in the nature of a notification or authorization to the receiving clerk at the steamship company's dock to accept the cargo described when delivered between certain specified dates. When delivery is made by truck, the permit is usually given to the truck driver who presents it to the receiving clerk, and, after the goods have been removed from the truck, is given a "dock receipt." This document, which acknowledges receipt of the goods for dispatch by a certain vessel, is later exchanged at the steamship company's office for the formal bill of lading. When delivery is made by lighter, the lighter captain gives the shipping permit and his manifest to the receiving clerk and receives a dock receipt when his cargo has been removed and placed in the ship or on the dock.

If the shipment is not brought to the dock before the expiration date of the permit, the steamship company is at liberty to refuse the goods. On the other hand, if the shipment is delivered before the date specified on the permit, the steamship company is not obliged to receive the goods until the first date specified on the permit, and the shipper is responsible for any demurrage which may accrue in the meantime.

Many exporters, possibly the majority, employ a foreign freight forwarder to handle all the details of booking ocean space, arranging for pick-up and delivery of goods to the dock, the exchange of the shipping permit for the dock receipt, the exchange of the latter for the formal bills of lading, and all other details connected with getting shipments on board the steamer and preparing or obtaining all the necessary documents. The use of a freight forwarder, particularly by manufacturers located away from the seaboard, is usually a great convenience and the most economical way of handling the detail work connected with every export shipment. In carrying out this work, which is unfamiliar to many manufacturers located at interior points, the freight forwarder can operate in the same capacity as the manufacturer's own export office and can eliminate the necessity of establishing special offices at the various ports through which shipments are to pass.

As soon as a shipment is received on the dock, it is weighed and measured; and later it is checked into the ship. The dock receipt is made out in triplicate—the original is given to the shipper, the duplicate to the steamship company's office, and the triplicate is kept on file at the dock. The dock's copy is transferred on the ship's cargo sheets, which constitute the dock's record of the cargo going forward on each ship. The weight and measurement of cargo are entered in separate columns and totaled separately, and as the sheets are completed they are sent to the office where the arithmetical work is checked and the entries are compared with the dock receipts and bills of lading.

MEASURING THE CARGO

Manufacturers frequently furnish the steamship company with a packing list which gives the mark, number, weight, dimensions, and contents of each box, crate, or other package. This is of great help. Among other things, in case part of a shipment is shut out, the packing list makes it possible to know exactly what packages have gone forward. However, factory measurements are not always made according to steamship practice, and packing-list measurements should not, therefore, be accepted without verification. There have been many instances in which freight charges have been improperly calculated because of reliance upon manufacturers' measurements.

There is some slight variation between the methods of measuring used in different trades, but the method described in the following paragraphs, quoted from the North Atlantic United Kingdom Tariff No. 38, represents a usual and widespread practice.

> In computing fractions of an inch in cargo measurement, all fractions under a half-inch are to be dropped. Where there is a fraction of one-half inch or over in one dimension of a package this is to be included as a full inch. Where there are fractions of one-half inch on two dimensions of a package the one on the smaller dimension is to be included as a full inch and the other dropped. Where there are fractions of one-half inch on three dimensions, two will be included as full inches and the other dropped. When giving and taking fractions where these occur on three dimensions, the ones on the largest and smallest dimensions are to be included and the other dropped. All fractions exceeding one-half inch are to be included as full inches.
>
> In measuring barrels, casks, kegs, and drums, the measurements are to be taken on the square of the bilge.
>
> In measuring irregular packages, use the three greatest dimensions to determine cubic.
>
> In computing measurements to determine rate to be applied where weight rate is predicated on measurement per ton, the actual fractions may be used.

HANDLING CARGO ON THE DOCK

The work of the dock force in assembling and placing cargo on the dock after it has been received and receipted for must be planned in such a manner as to make the work of loading and stowing proceed at maximum possible speed under existing conditions. Upon the effectiveness with which this work is carried out depends in large measure the length of time the vessel being worked will remain in port. The saving of even a single day is of real importance, as every ship owner or operator knows.

The handling of miscellaneous general cargo after its receipt at the dock until its final stowage in the ship may be divided into four stages or operations: (1) The assembling of the goods at temporary

storage places on the dock; (2) the transfer of the goods to the pick-up place where they are to be lifted on board the steamer; (3) the actual loading of the goods or their transfer from the pick-up point to the steamer's hold, and (4) the stowage of the goods in the hold. The first two operations are considered in the present chapter. The methods and equipment used to transfer goods from dock to ship are discussed in the following chapter—Loading and Unloading Equipment and Methods—and the subject of stowage is dealt with in the several chapters devoted to different phases of the stowage problem.

ASSEMBLING CARGO ON THE DOCK

The assembling of cargo on the dock will usually be governed in large measure by the stowage plan for the ship that is to be loaded. This plan, which should be, and generally is, drawn up well in advance of the time the ship is to load, will show the distribution of the various shipments throughout the vessel or the hold in which each particular shipment is to be stowed. It is the basis of quick dispatch. In some cases it is not possible to prepare the entire stowage plan ahead of time, owing to the fact that only part of the cargo has been booked at the time the steamer is ready to commence loading. When such a condition exists, there is, of course, a possibility that loading will be unavoidably slowed up both by delays in the arrival of cargo and by delays due to inability to plan where certain shipments already on hand are to be stowed.

With a copy of the stowage plan at hand, the dock superintendent or other individual in charge of the dock force should endeavor to place and assemble the various shipments, as they arrive, so that they can be transferred to the pick-up place with the least possible effort and in the shortest possible space of time. The cargo must be placed, insofar as possible, so that it can be moved into the ship in a continuous stream in the order in which it is needed—bottom cargo first, and other cargo for each hold as required.

Two fundamental points should be kept in mind in assembling the cargo on the dock:

1. Each shipment should be placed on the dock opposite to or near to the hold of the ship into which it is to be loaded.
2. Cargo that is to be loaded first should be placed near the side of the pier at which the ship is to lie, or should be placed so that it is readily accessible and not buried underneath other cargo that is to go into the ship later on.

It is obvious that very important savings both in time and labor can be achieved by following these two rules as closely as the space on the pier, the delivery of cargo, and other factors permit. Unquestionably, it calls for careful planning to provide the needed space opposite each hold for the numerous shipments that are to go into each hold, particularly when, as is often the case, the pier may be congested with cargo for several ships or with incoming cargo which has just been discharged and has not yet been picked up by the consignee.

The space can be made, however, and the needless moving of goods from one part of the pier to another can be largely eliminated, as experienced dock superintendents are proving every day. It is still not uncommon, however, to see shipments deposited near the entrance to the dock, left there for a time, then moved to some other point, which

may or may not be near the pick-up place to which they must ultimately be brought.

The additional problem of placing the cargo that is to be the first to go into the ship in places where it will be readily accessible when needed is likewise a matter of planning, and of applying the information provided by the stowage plan to the disposition of such cargo at the time that it is delivered to the pier.

In this connection, however, it must be realized that the delivery of cargo to the dock is subject to numerous unavoidable and harassing contingencies which oftentimes prevent the carrying out of carefully laid plans. As an experienced American shipping executive, commenting on this situation, recently stated:

> Theoretically, all of the heavy cargo should be loaded in the bottom of the steamer with light cargo on top. As a matter of fact, most of the steamers loading at United States ports call at two or three loading ports and three or more discharge ports. When a steamer is ready to load we usually find that all of the light cargo is at hand and the heavy cargo arrives at the time of sailing. Also, cargo for the first discharge port is available on the first day of loading and cargo for the last discharge port arrives just prior to sailing.

REDUCING NUMBER OF HANDLINGS

At some piers on which cargo is moved between the shed and the apron on skid platforms carried by lift trucks, on pallets carried by fork trucks, or on trailers pulled by tractors, packages or pieces are placed on the skid platforms, pallets, or trailers at the time they are delivered to the pier. They are then in readiness to be moved to the ship's side and into the ship. This practice is of great value in reducing the number of handlings and greatly increases the labor productivity in cargo handling.

Economies in cargo-handling can probably be made at many piers by applying the principles of reducing handling to the minimum (as above), and increasing the size of the unit handled, thus reducing the total number of units to be moved.

For example, at some Pacific coast ports canned goods in cases are stacked on pallets at the cannery and the loaded pallets are delivered to the pier by motortrucks. When loading commences, the pallets are brought to the ship's side and hoisted into the hold where the cases are removed from the pallets and stowed. In this way, a unit of 40 to 60 cases is handled each time instead of one individual case, and the total handling time is drastically reduced. This principle is doubtless applicable to the handling of other types of cargo on other piers.

LIGHTER CARGO

In United States ports, such as New York, where lighters are extensively used for delivering cargo to shipside, the dock force has the problem of properly "permitting" or timing the arrival of lighters and of unloading them expeditiously to prevent the lighters from claiming for demurrage. If lighters arrive alongside before the ship is ready to take their cargo on board, demurrage may result. If, on the other hand, lighters arrive too late, the ship's loading may have to be slowed up pending their arrival, since a certain cargo space may have been allotted to the lightered cargo and be unsuitable for other goods on hand on the dock.

When a lighter reports, the customary procedure is to record its name, number, permit date, time of arrival, and cargo on a "lighter slip." At the end of each day on which the lighter is worked, the lighter clerk deducts the amount of cargo removed from the lighter from the previous total on board, continuing this record until the lighter is completely discharged. At the beginning of each day's work, the usual practice is to make up a "lighter list" from these records, for the information of the stevedore and the office. The lighter list shows how much cargo is left on lighters alongside, and at the same time the weight and measurement of the cargo on the dock is reported, so that everyone concerned may know just how much cargo is on hand.

Shifting tugs are used at New York and at some other ports, and are very necessary in order to shift lighters from hatch to hatch as well as to place loaded lighters alongside and take empty lighters away. Many delays have been occasioned, owing to shifting tugs not being on hand at the proper time; this is, therefore, another matter which requires the close attention of those in charge of operations on the pier.

LIGHTERS ARE USED TO INCREASE SPEED

Lighters may frequently be used to increase the speed of loading and discharging, thus decreasing the ship's time in port, by working cargo from lighters on the offshore side of the ship at the same time that other cargo is being handled from the pier. In handling automobiles at some ports, for example, the automobiles (even though not delivered to the pier by lighters) are loaded onto lighters before the ship's arrival. This helps to clear the pier and prevent congestion and delays in moving the other cargo to the ship's side.

If the ship has sufficiently large hatches, such as those on the new Maritime Commission vessels, the automobiles may be loaded from the lighters into a lower hold while other cargo is loaded at the same time into the 'tween decks from the pier. Or, as is frequently the case, the automobiles may be loaded into the 'tween decks while other goods from the pier are being worked into the lower hold. The same principle may also be used to speed up the rate of discharge.

APPLYING PORT MARKS

When a ship is being loaded for a number of ports, the dock force can do much to protect the steamship company against the possibility of cargo being carried beyond the port for which it is destined or of being unloaded at the wrong port by port-marking all packages or pieces for each discharging port with a distinctive and easily visible color or mark. Straight paint-brush strokes of different colors—a different color for each discharging port—may be used; also crosses, squares, circles, triangles, or other shapes applied by means of a stencil.

One of the long-established American steamship companies, after experimenting with other methods, finally adopted the use of large colored pencils for applying port marks. The color does not rub off, and the pencils are very convenient to use, as they can be carried in the pockets of the men charged with applying the marks and are thus instantly available when and where needed.

Port marks are sometimes applied on the dock, and sometimes by a ship's officer stationed in the hold. If the latter course is adopted, there is greater certainty that the marks will be applied where they can most easily be seen when the various ports of discharge are reached and the cargo is being broken out.

Some steamship companies use a single pier for loading ships serving two or more routes and, in some cases, two or more lines serving different destinations may use the same pier. When this is the case, it has sometimes been found advisable to mark cargo according to its route as well as its port of destination. A simple but effective system is to indicate the route by the shape of the mark, such as a square, circle, or triangle, and to indicate the port of destination by a color. Thus, on a pier serving two routes or lines such as, for example, one going to West Indies ports and one to South American ports, all West Indies cargo might be marked with circles and all South American cargo with triangles, the circles and triangles being of different colors to indicate the different ports of call.

CHECKING CARGO INTO THE SHIP

It is of the utmost importance that an accurate check be kept of the cargo actually loaded into the ship. This information is needed for the preparation of an accurate final stowage plan, and also to serve as an absolutely reliable source of information for the ship's officers when the various discharging ports are reached. Some of the experienced American steamship lines check the actual loading by having check clerks on the dock fasten a slip of paper to each package, the paper bearing the marks and numbers of the package. A ship's officer stationed in the hold or 'tween decks removes these slips when the cargo is lowered into the ship. At the end of the day, all the slips are collected and the location of each consignment is entered in the stowage plan.

EQUIPMENT USED IN HANDLING CARGO ON THE DOCK

In handling general cargo on the dock it is in most instances necessary (1) to move it from the truck or other delivery vehicle to a temporary storage point on the pier, and (2) later to move it from the temporary storage point to the pick-up point on the apron of the pier, and (3) an operation frequently involved is the stacking or tiering of cargo on the pier to save space and prevent congestion.

A number of types of equipment for conducting these operations with a minimum expenditure of time and labor have been developed within recent years. A discussion of the major types of equipment now in general use is included here, both as a matter of general information for those who are unacquainted with this field, and as of possible value to others who, by the introduction of more efficient equipment, may find it possible to improve their present methods of handling cargo on the docks and thereby effect economies, either by reducing handling costs per ton or by speeding up the loading and unloading of cargo and thereby reducing ship's time spent in port.

HAND-OPERATED EQUIPMENT

TWO-WHEELED HAND TRUCKS

One of the most common pieces of equipment used for transferring cargo from one part of the pier to another is the two-wheeled hand truck. For moving packages short distances it is efficient and convenient. In addition to handling cargo on the pier, the hand truck is of great service for handling lighter cargo and for working in the hold of the ship. Modifications in the construction of two-wheeled hand trucks make them adaptable for handling different commodities, such as cotton bales, rolls of paper, bagged cargo, or barrels. In some cases the use of such specially designed trucks can save a great deal of time and do much to eliminate damage to cargo when being handled on the dock.

Considerable skill and practice are required on the part of the operator, as time-saving factors. Three men are usually needed to operate this type of truck and keep it moving—one man to wheel it, and two to load it.

When loading boxes on a hand truck, the heaviest and most strongly constructed should be put on the truck first, with lighter ones on top, in order to prevent the crushing or puncturing of light packages. When unloading boxes, the truck should be allowed to come up slowly so the stack of boxes will not fall over and crash to the floor. When the truck is in the position of resting on its wheels and nose, with handles upright, the load is tipped slightly and the nose of the truck withdrawn from beneath it.

When loading a barrel, hogshead, or tierce, the operator should tip it slightly, push the nose of the truck under it, and then reach forward with the left hand and pull the barrel and truck together back toward his body until the truck is in proper balance. A helper may be needed if the load is heavy. Flour barrels and other relatively small barrels are frequently loaded with one standing on end and another resting crosswise on top.

When loading bagged cargo, such as sugar, coffee, rice, and nuts, two men grasp the bags, one at each end, and load them on the truck. The first bag is usually placed on its narrow side on the nose of the truck, so it will not hang over and be cut by the sharp steel edge of the nose. The remaining bags are placed on their wide sides so that a greater number can be loaded on the truck.

FOUR-WHEELED PLATFORM TRUCKS

The first important change made in methods of moving cargo on the dock and to or from the ship's slings was the introduction of four-wheeled platform trucks operated by manpower. While trucks of this type have now been largely replaced at ocean terminals by power-driven equipment, they are still used at some ports for services for which they seem best suited under existing local conditions. Thus, at some southern ports they are used in the operation of unloading sugar. In such an operation the platform truck has a marked advantage over the hand truck, since the cargo being discharged from the ship can be lowered directly onto the truck and moved into the shed.

With hand trucks the sling would have to be landed on the apron and its load of bags pulled clear and loaded onto several hand trucks for transfer into the shed. It is obvious that the use of platform trucks in such an operation eliminates several handlings of the cargo and also more rapidly clears the space on the apron directly under the ship's hook where the cargo is landed, thus permitting more constant operation of the hook. In using a four-wheeled platform truck in the operation of loading cargo, sling loads are frequently made up on the truck's platform and, after being transported to the apron, are lifted directly from the truck to the ship.

POWER-OPERATED EQUIPMENT

The next development in the field of transferring cargo on the dock was the introduction of trucks of different descriptions, propelled by gasoline engines or electric motors. Power-operated equipment on a pier has two major advantages over the hand-operated truck—it can carry a heavier or more bulky load, and it can move the load more rapidly. If, in addition, the power equipment is of such a nature as to make possible high stacking of heavy freight, there is an added advantage as compared with the hand operated truck.

POWER-OPERATED PLATFORM TRUCKS

There are four principal types of power-operated platform trucks now in common use, which may be classified as follows:

(1) Ordinary, nonelevating platform trucks, which carry loads on their own platforms and are usually loaded by hand (fig. 1); these are made in two types—high and low platform. The high platform is approximately 24 inches high, and the low platforms are standardized at 17 and 11 inches. Different heights can, of course, be obtained if required.

(2) Trucks of the "elevating-platform" or "low-lift" type, which are designed to pick up and carry on their flat platform or body loads placed on wooden or metal skid platforms (fig. 2). These trucks have movable platforms which can be raised or lowered a few inches by a separate electric motor provided for that purpose. In picking up a loaded or empty skid platform, the truck approaches it, runs the platform under it, and electrically elevates it from the floor.

(3) Trucks of the "tiering" or "high-lift" type are similar in operation to the "elevating-platform" type, but have the added feature of being able to lift or tier the load to a height of 6 feet or more (fig. 3).

(4) Crane trucks. Platform trucks equipped with a small electrically or hand-operated crane (fig. 4).

Nonelevating platform trucks.—Power-operated platform trucks which carry their own loads (see fig. 1) are propelled either by electric or gasoline motors. They are built in various sizes, are capable of carrying up to 20,000 pounds, and may have either three or four wheels. In both the three-wheel and four-wheel types the control is flexible and the comparatively short wheel base makes possible a short turning radius. The platform is usually from 20 to 24 inches above the ground, although specially designed "low-plat-

form" types have a platform placed from 11 to 17 inches above the ground. Different types are available in which the steering is accomplished by all four wheels in order to increase the ease of operation in congested spaces, in which driving power is transmitted to all four wheels in order to attain maximum adhesion, and many other modified types of construction have been developed to permit quick and efficient moving of goods.

Trucks of this type have the same advantages over hand trucks as those cited above for hand-operated platform trucks. They are especially adapted to work where they must be driven, loaded, and unloaded by a single operator, for short hauls on the dock, and "across-the-dock" service.

The "low-platform" type of truck is suitable for carrying heavy packages and pieces weighing, say, 150 pounds and over, such as bar-

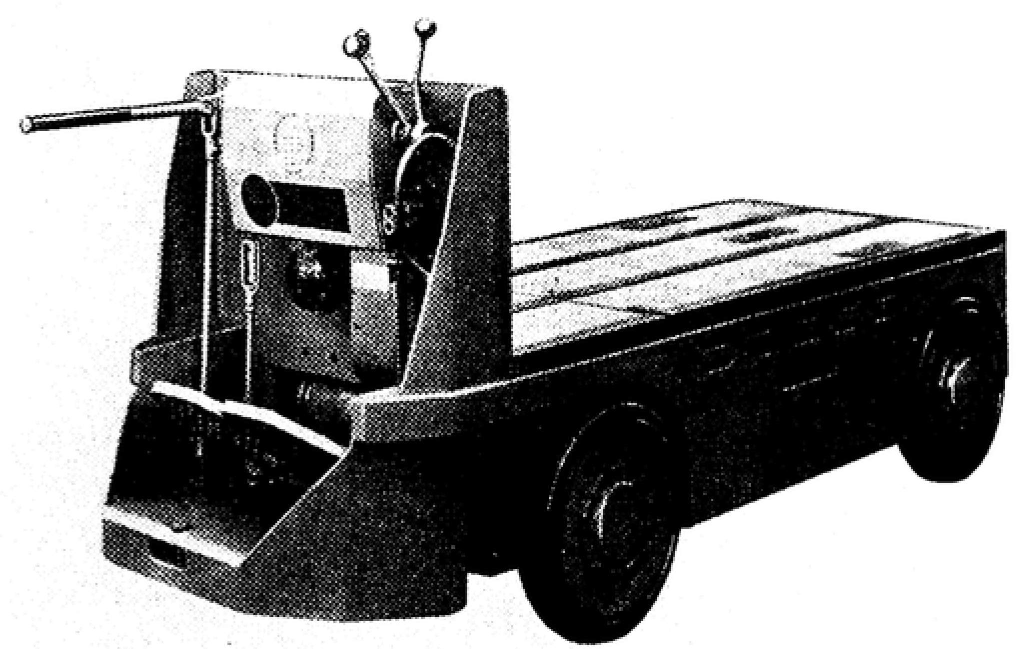

Figure 1.—Nonelevating platform truck.

rels, heavy bales, crates, and castings. The greater the weight of the separate packages to be loaded, the lower the platform should be. It has been demonstrated, for example, that after piling is carried to a certain height, it is false economy to require lifts that waste or overtax workers' energy. As a general rule, packages or pieces weighing from 150 to 200 pounds can seldom be lifted above the knee; those weighing 75 to 100 pounds, waist high; and those weighing 25 pounds to 35 pounds, shoulder high.

Elevating platform type or low-lift trucks.—The elevating platform or low-lift trucks are built in various sizes, with platforms that are usually about 10 to 17 inches above the ground when in the lowered position (fig. 2). They usually have a lift of from 4½ to 6 inches; capacities range from 3,000 to 60,000 pounds. This type, which picks up and delivers loaded skid platforms, is able to work more steadily than the platform trucks just described which carry

their own loads and must be loaded and unloaded each time they move a group of packages. Consequently, transfer of goods on the dock is speeded up through the elimination of some loading and unloading; fewer trucks are needed, since one truck can handle a number of skid platforms; and risk of loss by damage may be reduced, because packages are handled fewer times. Furthermore, a saving in floor space may be effected, since the skid platforms can be stacked when not in use.

An interesting application of the elevating platform truck and skid platforms is described by Stern:[3]

In New York a certain shipping company * * * discharges large quantities of canned goods and loads large quantities of flour in the port of New York. Most of the cargo is discharged on lighters and then delivered to the railroad pier, where it is to be loaded into box cars. In loading cargo the process is reversed. Formerly individual packages had to be handled several times on their way between the ship and the railroad car, and vice versa, but now, in discharging cargo the commodities are placed on skids in the hatch of the ship, lifted over-

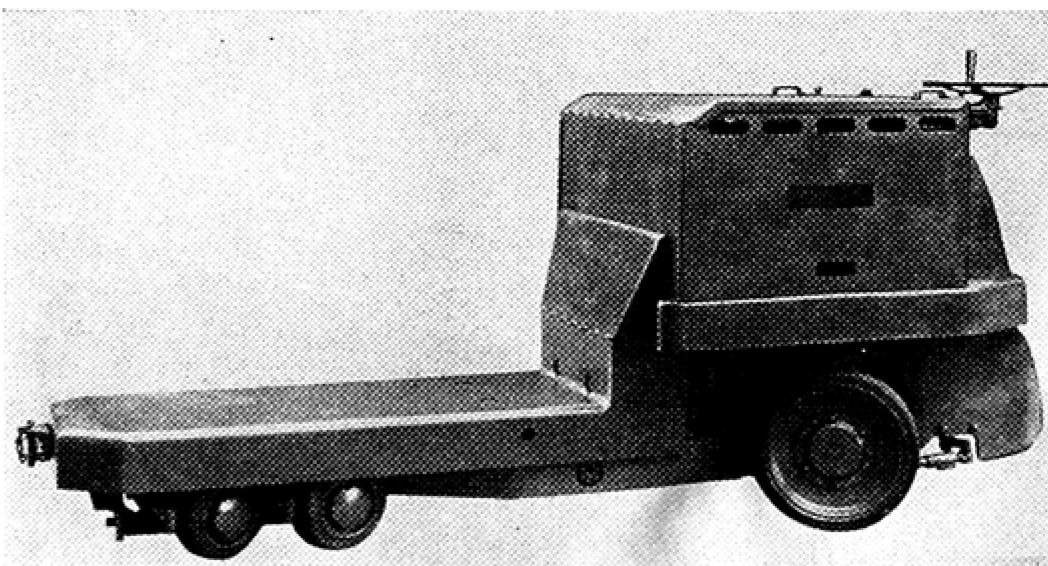

Figure 2.—Low-lift elevating platform truck, designed to carry wooden or metal skid platforms.

board to the lighter, where a lift truck removes the loaded skid from under the ship's hook to its place on the lighter. The commodities are left intact on the skids, and at the railroad pier the lift trucks remove the loaded skids from the lighter directly into box cars, where the commodities are removed from the skid and stowed into the car.

When loading the ship, the commodities are placed on skids, in the box cars, in which they are delivered to the railroad pier. The lift trucks remove the skids from the cars to the lighter, and leave the loaded skids on the lighter. From the lighter the loaded skids are lifted aboard ship and into the hatch, where the individual commodities are removed and stowed away in the ship's hold. Whether in loading or discharging cargo, the lift truck and skid system thus used requires only one operation of loading and one operation of discharging the skid, during the entire process of transferring the cargo from the ship to the lighter, to the pier, and to the railroad car, or vice versa.

In spite of the success of the company in greatly reducing its cost of cargo handling by the new system, the universal adoption of the lift truck and the skid method is confronted with serious drawbacks: (1) It can be used effectively for uniform cargoes only. Mixed cargoes in different containers can not

[3] Stern, Boris. Cargo Handling and Longshore Labor Conditions. U. S. Department of Labor, 1932. Government Printing Office.

be easily handled on the skids; besides, the sorting and classifying of the commodities nullify most of the economies effected by the skids. (2) The numerous empty and loaded skids occupy too much space in the shed of the pier. Even the larger piers soon find themselves congested with these skids, while the average and the smaller piers, which predominate in this country, can not possibly find the necessary space for a successful application of the lift truck and skid system.

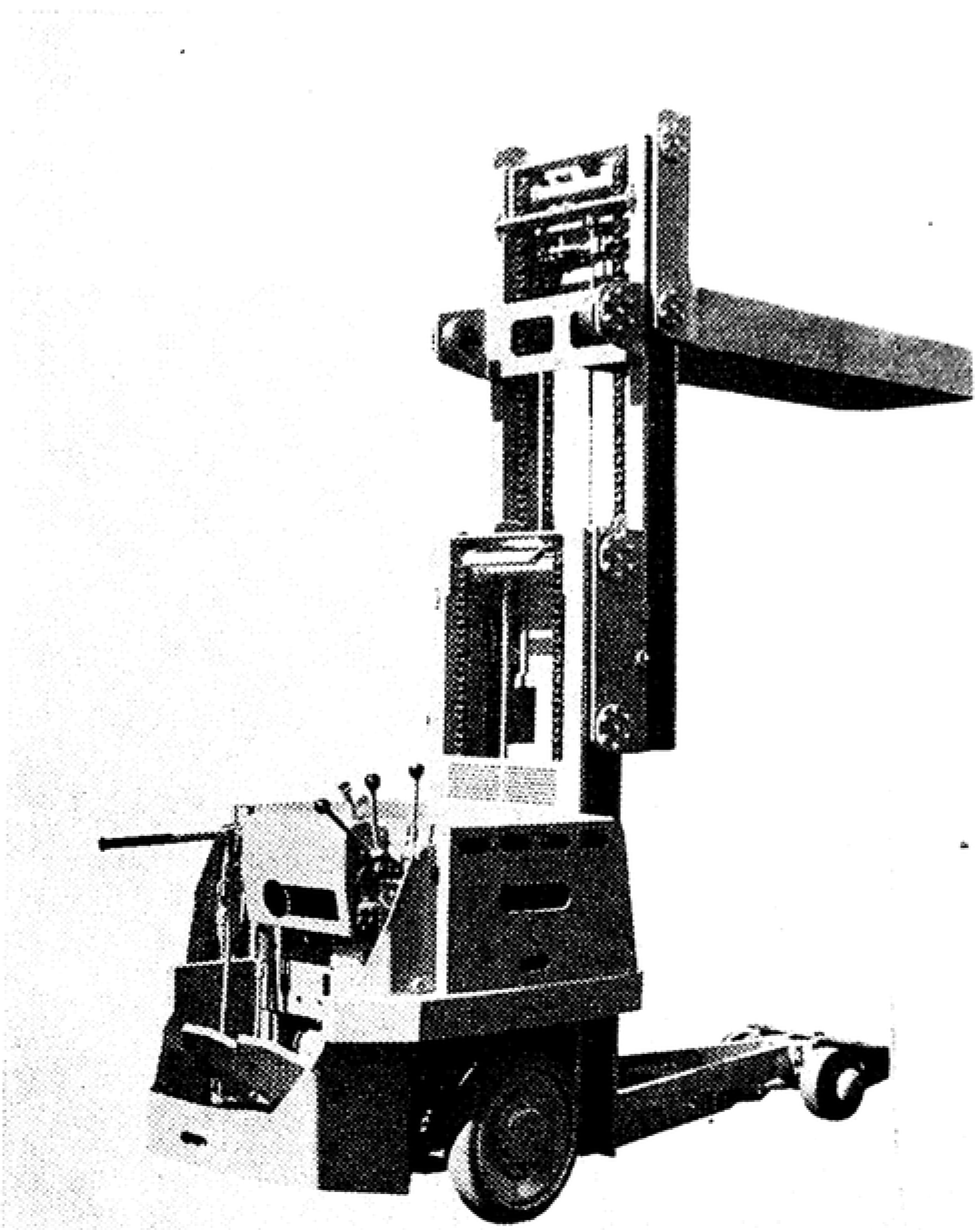

Figure 3.—Tiering or high-lift elevating platform truck.

Tiering type or high-lift trucks.—The tiering type of platform truck is used with skid platforms in the same manner as the elevating-platform type, but in addition can lift its load upward for 6 feet or more, so that it can be placed on top of other goods assembled on the pier (fig. 3). These trucks are made with capacities up to 50,000 pounds, but the average truck in general use for stevedoring purposes is probably of 2- to 3-ton capacity. They are available in two

general types: Single lift, and multilift or telescopic. The single-lift type usually raises its load to a height of about 5 or 6 feet, whereas the telescopic type can elevate its platform to about 9 feet.

Crane-type platform truck.—Essentially a four-wheeled platform truck with a crane installed either permanently or temporarily at one end; particularly suitable for handling heavy weights (fig. 4). The cranes in common use are either hand- or electrically-operated and generally are capable of lifting from 1,000 to 10,000 pounds. The boom is equipped with a swivel base which permits it to swing 135 degrees each way, or to a position on either side well past a right angle to the body of the truck. The load is carried on the hook or is lifted by the crane to or from the truck platform and carried on the platform. These trucks not only enable cargo to be moved rapidly, but also assist in piling it rapidly on the pier.

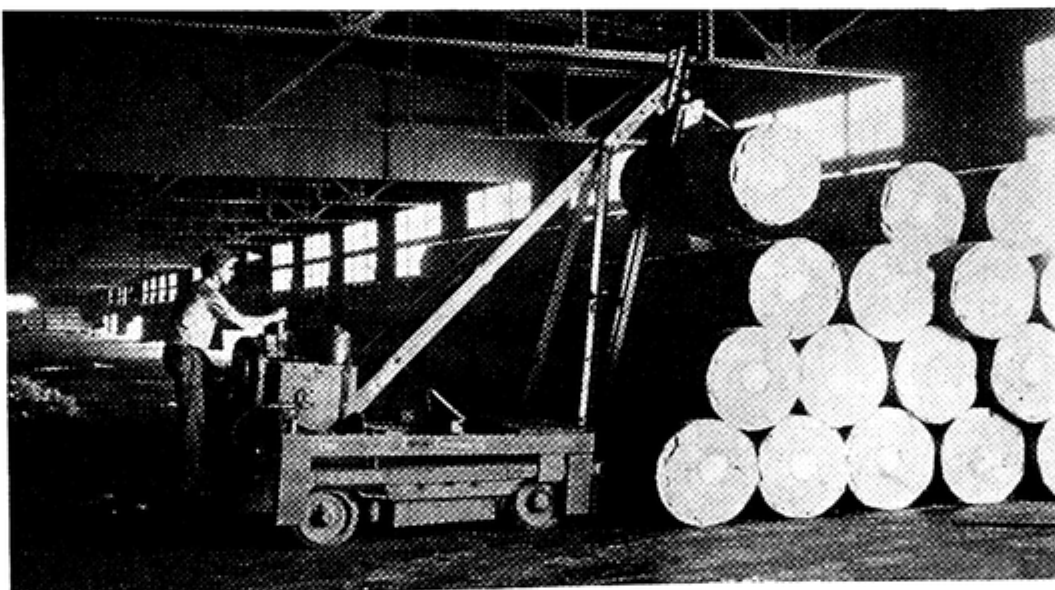

Figure 4.—Crane truck piling rolls of paper.

FORK OR LIFT TRUCKS

Fork trucks, sometimes called lift trucks (as are also the elevating-platform type of truck), are here considered separately from platform trucks because they are of a radically different type of construction. The fork truck does not carry its load on the body or platform of the truck, but on a special support or mast mounted on the front of the truck (fig. 5). At the bottom of the mast, and projecting forward from the truck are the forks—two bars parallel to the ground. In lifting a load, the forks are run beneath a loaded skid or pallet, and the mast is raised and tilted slightly backward to hold the load securely. The load is then carried to its destination. Some of these trucks intended for handling lumber, steel, and other heavy loads have capacities of up to 20,000 pounds, but the trucks in general use usually have capacities of about 4,000 to 6,000 pounds.

Fork trucks are also able to tier cargo on the pier. A separate motor elevates the forks so the load can be lifted for 6 feet or more and placed on top of other loads already in place on the pier. In

tiering goods, the load is first elevated and then the mast is tilted forward to release the loaded skid or pallet and place it on the stack.

Fork trucks are used on the floor of the dock and are also employed for transferring cargo to the interior of ships that are loaded through side ports. The latter operation is discussed in the chapter on Loading and Unloading Equipment and Methods.

There has recently been developed a fork truck, which has an upper "jaw" extending forward from the top of the mast over the load. The function of the "jaw" is to hold the load down in place, so it will not be bounced off or shaken out of alinement while being transferred. When the fork has picked up a pallet under a pile of goods, the truck's lifting mast is set in motion by means of a lever at the driver's right hand. The load then moves up until the upper "jaw" contacts the top of the pile. Then, with a self-compensatory spring-

Figure 5.—Fork truck delivering skid load of baled goods at shipside.

tension "pinch," the bite is kept just firm enough to keep the pile in alinement and prevent spillage while the operator drives the machine to its destination.

It is claimed that the addition of this device permits carriage of larger loads per trip, allows faster travel, and does neater, more accurate stacking because pallets can be loaded to the full height of the stack. In some cases, with the more accurate stacking made possible, no helper is required to aid the operator of the truck on the stacking end of his trips. The upper "jaw" or spring-tension grip is removable when the truck is needed for handling other types of material.

THE TRACTOR AND TRAILER SYSTEM

In the tractor and trailer system of transferring cargo (fig. 6), a separate gasoline or electrically propelled tractor, with either three or four wheels, pulls a number of four-wheeled trailers. The chief advantage of this system is that more than one trailer can be moved

at the same time and the tractor may be engaged elsewhere while the cargo is being loaded on or removed from the trailers. The tractors used for this work are usually of very narrow gage, with a short wheel base. They can operate in very close quarters, make sharp turns, pass through narrow doorways and up steep gangplanks, and are capable of either pushing or pulling a load. Heavy bumpers, front and rear, protect both machine and operator.

The trailers usually employed are developments of the four-wheeled platform truck, but are generally built stronger and with greater carrying capacities than the hand-operated platform trucks. There are many different forms of construction—the trailers having wheels of various sizes and types. Their platforms are usually of hard wood

Figure 6.—Tractor and trailers transferring flour from apron to pier shed.

which may be fully protected with sheet metal for hard service. Trailers are provided with special couplers, as an aid in connecting, and also to reduce the outward or inward creep when rounding corners. Under certain conditions trailers may be used as hand trucks.

It will be found in many cases that in addition to the savings in time, labor, and money made possible by the use of tractors and trailers, the handling of cargo on the dock may be reduced to a minimum. This is made possible by providing a sufficient number of trailers so that cargo may be placed on trailers when it is delivered to the dock, and kept on trailers until the time comes to move it to the apron, or to make up the draft for the ship's sling. Cargo handling can sometimes be still further reduced by hoisting the loaded trailers into the ship through the hatches and unloading the trailers in the ship's lower hold or 'tween decks.

It has been demonstrated in a number of operations at different piers that where "less-carload"[4] and package freight are to be handled at steamship docks in the loading and discharge of vessels and the movement of freight to and from railroad cars at steamship terminals, tractors and trailers of the proper design and construction in the proper amount and operated under the proper method may effect considerable savings in the cost per ton, savings in the time required for the operation, and savings in the OS&D (overs, shorts, and damages). They are usually employed to best advantage when pallet loads are to be transported a considerable distance, fork trucks being used when the distances are not so great.

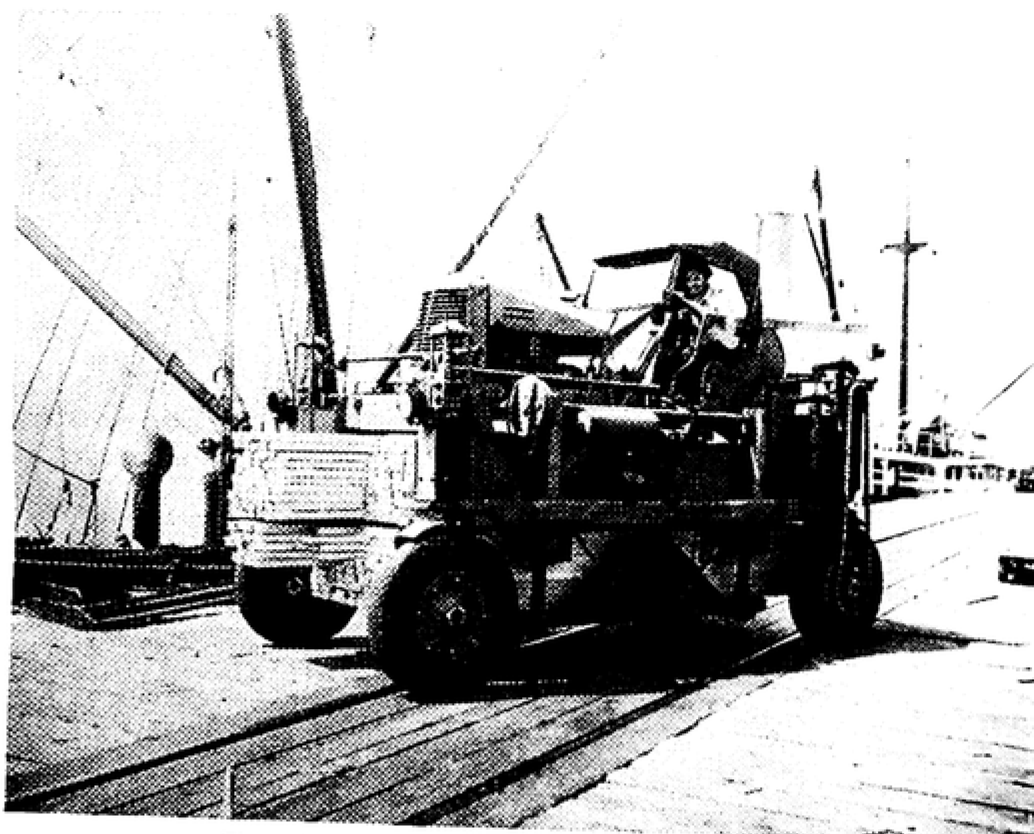

Figure 7.—Unit carrier delivering lumber to shipside.

UNIT CARRIERS

A special type of cargo-handling truck has been designed for handling lumber (fig. 7). These trucks are of the so-called "straddle" type, and are now used at some ports for steel and other long and bulky heavy cargo, as well as for lumber. Lumber readily lends itself to assembling in unit loads and because of this it is convenient to assemble it in definite-size packages or loads. The principle employed by the unit carrier utilizes this fact. Lumber to be moved from one point to another is piled in predetermined quantity on two metal cross-pieces or cross-bolsters. The carrier then straddles the load and picks it up by lifting the bolsters upon which the load is piled.

[4] Less-carload freight consists for the most part of relatively small packages, wooden boxes, fiberboard cartons, and the general run of mixed commercial merchandise.

The operation is simple in the extreme, the lumber being picked up, transported, and lowered at its destination without the driver of the carrier leaving his seat. Carriers of this type are built with capacities ranging from 3 to 20 tons and can consequently be furnished for handling many types of transfer and material handling operations.

PORTABLE CONVEYORS

Portable conveyors of the endless-belt type and the screw type (figs. 8 and 9) are used on a number of modern United States piers for piling or stacking cargo. These pieces of equipment are especially suited for handling bagged or other uniformly packaged commodities. Portable conveyors are also used for loading and unloading and their employment in this connection is referred to in chapter II, Loading and Unloading Equipment and Methods.

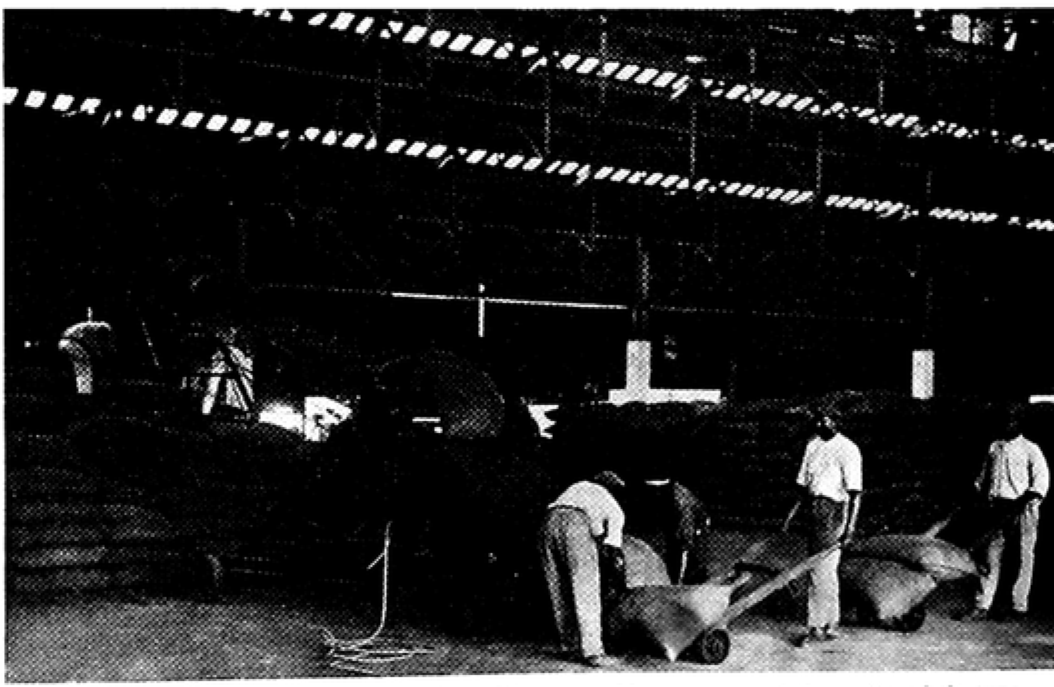

Figure 8.—Stacking coffee on the pier with a portable conveyor of the endless-belt type.

USES OF HAND AND POWER EQUIPMENT FOR DIFFERENT CLASSES OF CARGO

The application of the various types of equipment available for handling miscellaneous cargo on the dock depends in large measure upon the specific nature of the goods to be moved. The objective to be achieved is the development of the best and most economical method of handling each particular class of cargo on the particular pier at which the operation is to take place. This involves consideration of the construction of the pier, the construction of the ships to be loaded, and the kinds of cargo that most commonly pass over the pier.

According to a study made recently by an executive of one of the major materials-handling-equipment companies, miscellaneous general cargo, for practical purposes, may be divided into four general classes, as follows:

(1) "Less-carload" freight consists for the most part of relatively small packages, wooden boxes, fiberboard cartons, and the general run of mixed commercial merchandise.

(2) "Carload" freight consists of large lots of uniformly packed merchandise, whether in wooden boxes, bags, fiberboard cartons, barrels, or other containers, which can be kept together.

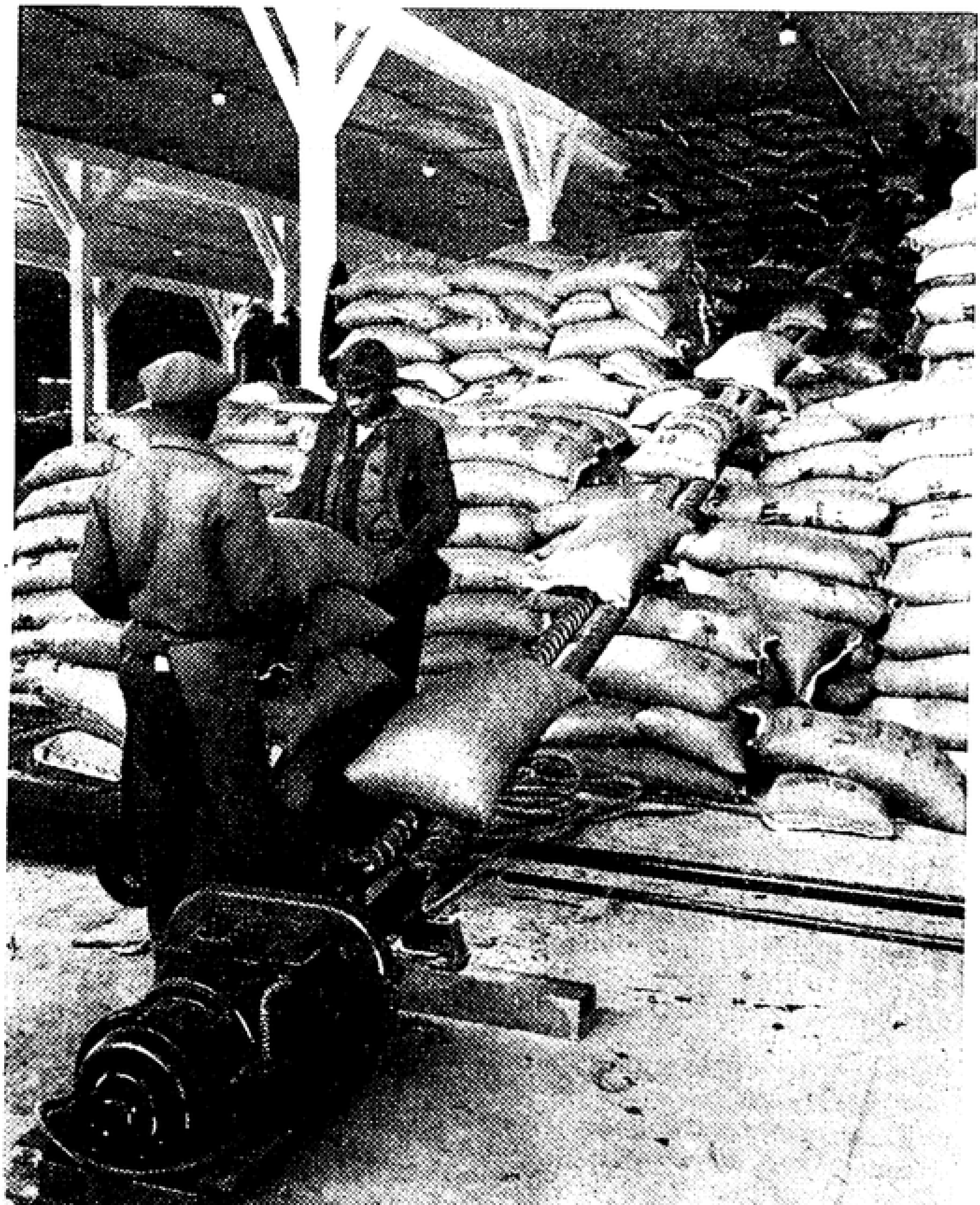

Figure 9.—Piling bagged cargo by screw-type portable conveyor.

(3) Heavy concentrated cargo, such as steel sheets, tin plate, etc., which is not as a rule tiered very high; also such cargo as bales of rags, cotton, waste paper, and burlap.

(4) Large packages, too heavy to lift by ordinary manpower and too awkward to handle with commonly used mechanical equipment.

The methods of handling these four classes of cargo, as shown by experience to be suitable under conditions existing at many piers, are as follows:

Class 1.—Miscellaneous light-weight cargo must chiefly be moved horizontally, the need for separation and classification of individual shipments tending to prevent high tiering. Satisfactory equipment for horizontal movement consists of tractors and trailers and fork trucks, supplemented by hand trucks. For loading and discharging, power belt conveyors or gravity roller conveyors are used where practicable.

Class 2.—Carload freight may also be well taken care of by means of tractors and trailers for the horizontal movement. If storage is necessary, and particularly if floor space is at a premium, this class of cargo may be put on pallets, moved horizontally by trailers, and then tiered by means of a fork truck. It may also be handled by platform lift trucks of the elevating platform type, particularly if kept in storage for a relatively short time, in which case a number of platforms that might be used elsewhere will not be tied up.

Class 3.—Heavy concentrated cargo can usually be well handled by fork trucks, owing to the nature of the packages.

Class 4.—Heavy, awkward-to-handle cargo frequently requires a crane or a crane truck, either to pick up the packages and place them on proper trailers for a horizontal movement, or in some cases for transportation from one position to another by the crane or crane truck. It can also be conveniently handled by means of fork trucks.

Some coastwise steamship companies, whose vessels load through side ports, economize by placing cargo, when received at the dock, on the pallets used with their fork trucks, then transferring the loaded pallets directly to the ship when loading commences. The loaded pallets are then kept on the ship and carried to destination, where they are unloaded onto trailers by a fork truck working in the ship.

Other steamship companies, whose vessels are loaded through hatches, sling loaded trailers and skid platforms from the apron of the pier into the ship, thus saving the time and the extra handling that would be involved in making up a draft in a sling. These loading methods are referred to in greater detail in chapter II, Loading and Unloading Equipment and Methods.

An effective combination of two types of power equipment has been developed at Cristobal, C. Z., where a good deal of cargo is transferred from one pier to another. Here, the tractor and trailer system is used in combination with elevating platform lift trucks and skid platforms. Cargo to be loaded on a ship is first placed on a skid platform; the platforms are then placed on trailers and are carried to their proper piers. There the lift trucks remove the skid platforms from the trailers and deliver them to the ships to be loaded.

HANDLING CARGO DISCHARGED FROM THE SHIP

Handling inward general cargo discharged from a large ship is frequently a much more complicated procedure than handling an outward cargo. This is largely because the inward cargo must usually be sorted according to marks and consignees, so that all the goods in each individual lot may be put together in one place or pile. If errors are made or if adequate space is not available, and one consignment is piled on top of another, it is necessary later to break out these piles and move them about the wharf. This is all waste that should be eliminated through proper organization and planning, and, where possible, proper wharf design.

When there are thousands or even tens of thousands of packages or pieces of inward cargo, as is frequently the case, the marks or labels of which have to be individually inspected, the magnitude of the operation and the possibilities for delay in its execution may readily be imagined.

Following the sorting of the cargo, the principal movements are: (1) The delivery of goods to railroad cars; (2) to trucks; (3) to lighters; or (4) to a warehouse adjacent to the pier. The placing of the cargo on the dock must be done with the further movement or disposition of each particular consignment in mind.

As a rule, inward cargo is sorted and classified immediately after the sling load is landed on the apron of the pier. The small area under the ship's hook on the apron of the pier is, consequently, one of the key points in determining the rate of discharge of miscellaneous cargo. While the dock crew is occupied in sorting a sling load, the hook of the ship either stands idle or hangs over the deck of the ship with another load of cargo ready to be lowered onto the apron. The speed of discharge will vary, therefore, according to the speed with which each sling load is sorted and removed from the apron to its further destination on the pier.

SPEEDING UP THE SORTING OF INWARD CARGO

It has been asserted by competent terminal engineers that sorting of inward cargo costs hundreds of millions of dollars yearly [5] and, when ship's time and all the other cost factors involved are taken into account, this may well be the case. While many other operations on the pier have been greatly improved by the introduction of proper equipment, no new device has been developed to hasten the absolutely necessary sorting operation.

There appears to be only one method by which sorting can be simplified and speeded up. This method is relatively easy to put into operation and, of greatest importance, experience has shown that it works. This is to organize the stowage of the cargo at the port or ports of loading, insofar as possible, so that all the packages in any one consignment are kept together in what are sometimes called "blocks," meaning separate easily identified groups. Admittedly, it is sometimes difficult to carry out such a plan, particularly when a ship's schedule calls for loading at a number of ports; but it is reasonable to believe that a determined effort would bring a definitely worthwhile result.

One American steamship company has reported that it reduced its costs of discharge in United States ports approximately 20 percent on an average of 6 months, as compared with the preceding 6 months. This was done chiefly by proper stowage on the ship at loading ports, by which cargo was put into blocks according to the marks. Some steamship companies have adopted the practice of separating individual shipments by means of heavy paper. This has been found very satisfactory with cargoes such as coffee and cocoa beans, of which there may be on a single vessel 200 or more separate

[5] Brinton, Willard C. Marine Terminal Operation. (A paper presented before the First National Meeting of the A. S. M. E. Materials Handling Division, Philadelphia, April 1928.)

consignments. With block stowage of this type it is possible to make up sling loads inside of the ship so that each draft will contain packages bearing the same mark. No sorting then has to be done on the apron, and an entire draft can be taken at once to the position previously selected for it on the pier.

CHAPTER II

LOADING AND UNLOADING EQUIPMENT AND METHODS

Cargoes transported by water are of two kinds—bulk cargo, solid or liquid, such as coal, ore, grain, sulfur, or petroleum, all of which are shipped in bulk without containers, and general cargo, which consists of miscellaneous goods packed in boxes, bales, bags, barrels, drums, etc. General cargo may also be classed as mixed cargo, which is made up of numerous different commodities differently packed, and uniform cargo consisting of a single product each unit of which is packed in the same manner as the others. Cargo of the latter type would be, for example, case oil, paper, bagged sugar, rice, coffee, or flour. Such cargoes frequently move in shipload quantities.

BULK CARGOES

The principal bulk cargoes are usually loaded by means of mechanical equipment specially designed to handle the particular commodity involved. Thus, coal and ore are loaded by car dumpers of various types, grain is poured into a vessel through loading spouts, and oil is pumped into a tanker through flexible pipes. Other types of special equipment unload these cargoes in all major ports. The speed of loading and unloading depends chiefly upon the equipment used and the stowage, when required, is done chiefly by trimmers who should be overseen by ship's officers. Since it is a very specialized subject, the mechanical handling of bulk cargoes is not discussed in detail in the present volume. Discussions of the stowage of the principal bulk cargoes, however, are contained in the chapters, "Stowage of Special Cargoes" and "Commodities and Their Stowage," and reference to them is made elsewhere throughout the book.

GENERAL CARGO

General cargo is handled in United States ports chiefly by means of ship's gear or by the ship's gear in conjunction with cargo masts and winches on the dock. In this type of operation, the speed of loading and discharging and the adequacy of the stowage are largely dependent upon the skill and experience of the stevedores, the steamship company's dock force, and the ship's officers. Many hours of ship's time can be saved and other economies can be effected if these men are thoroughly familiar with the various methods of handling general cargo rapidly and safely. Important principles involved in the efficient loading, stowing, and discharging of general cargo are discussed in the following pages.

In discussing the work of loading and stowing a cargo vessel, Annin [1] points out:

The interests of the ship's operators and the stevedores, while not identical, are similar. The operators wish the greatest possible amount to be loaded in the least possible time, because the cargo is paid for by the ton, while the ship costs them a considerable amount each day, and every day that it is delayed is clear loss. The stevedore's interest is the same, because, while he is paid by the ton, he pays his men by the hour; in other words, he is on piece-work, while his men are on a time basis * * *. This necessity of keeping his gangs working often brings his interests and those of the operators into conflict, for it will sometimes impel him to take small stowage, such as boxes of dried fruit or condensed milk, and stow it all together, because it is the only cargo available, much to the annoyance of the operators, who have been holding that cargo for the express purpose of using it for beam filling. The operator has to watch for this trick, which * * * is known as "stealing the small stowage."

The great bulk of the general cargo moving in foreign, coastwise, and intercoastal trade is of the mixed or miscellaneous type, comprising numerous packages or pieces packed in many different kinds of containers, which must generally be handled individually or few at a time. These packages are transferred from the pier to the ship either by way of the ship's hatches, which is usual in most foreign-going and intercoastal shipping, or by way of side ports, which is the customary method in the coastwise trade and in the Great Lakes "package freight" trade. Many passenger liners and intermediate passenger and cargo liners also load cargo through side ports as well as hatches. It should also be noted that some commodities, such as lumber, are frequently carried on deck, and the problem of transferring such goods from pier to ship and vice versa does not, accordingly, involve passage through a more or less restricted opening, such as a hatch or a side port.

LOADING AND DISCHARGING THROUGH HATCHES

Loading and discharging through hatches is the common method of loading and discharging general cargo carried by oceangoing vessels. Several methods of transfer are employed, as follows:

By means of ship's gear exclusively: (a) Whip or single-fall and skid system (using one winch and one boom, with inclined skids or planks); (b) double whip or split-fall system (using two winches and two booms); (c) burton system (using two winches and two booms); (d) union or married-fall system (using two winches and two booms); (e) ship's deck cranes.

By means of ship's gear used in conjunction with cargo masts on the pier and pier winches.

By means of quay cranes.

By means of floating cranes (chiefly for heavy lifts).

By means of specialized equipment.

TRANSFER BY SHIP'S GEAR

In United States ports the most common method used for loading and discharging general cargo is by means of the ship's own gear or tackle. This is in marked contrast to the general practice in most European ports and in many major ports of the Far East and South America, which are generally equipped with overhead or gantry cranes. These are used almost exclusively for handling cargo from pier to

[1] Annin, Robert E. Ocean Shipping. The Century Co., New York, 1920.

ship and vice versa, the ship's gear being employed only occasionally in a supplementary manner.

Ship's gear is used for loading and discharging general cargo at most of the smaller foreign ports, such as those of the West Indies, the West Coast of Africa, and the numerous relatively small ports of South and Central America. In many of these ports cargo is transferred from or to lighters while the ship is anchored offshore or in a roadstead. During rough weather, when both the ship and lighter are rolling and pitching heavily, the operation is difficult in the extreme and there is considerable danger of damage to cargo unless the men operating the ship's winches and those directing them are skillful and seasoned in their work.

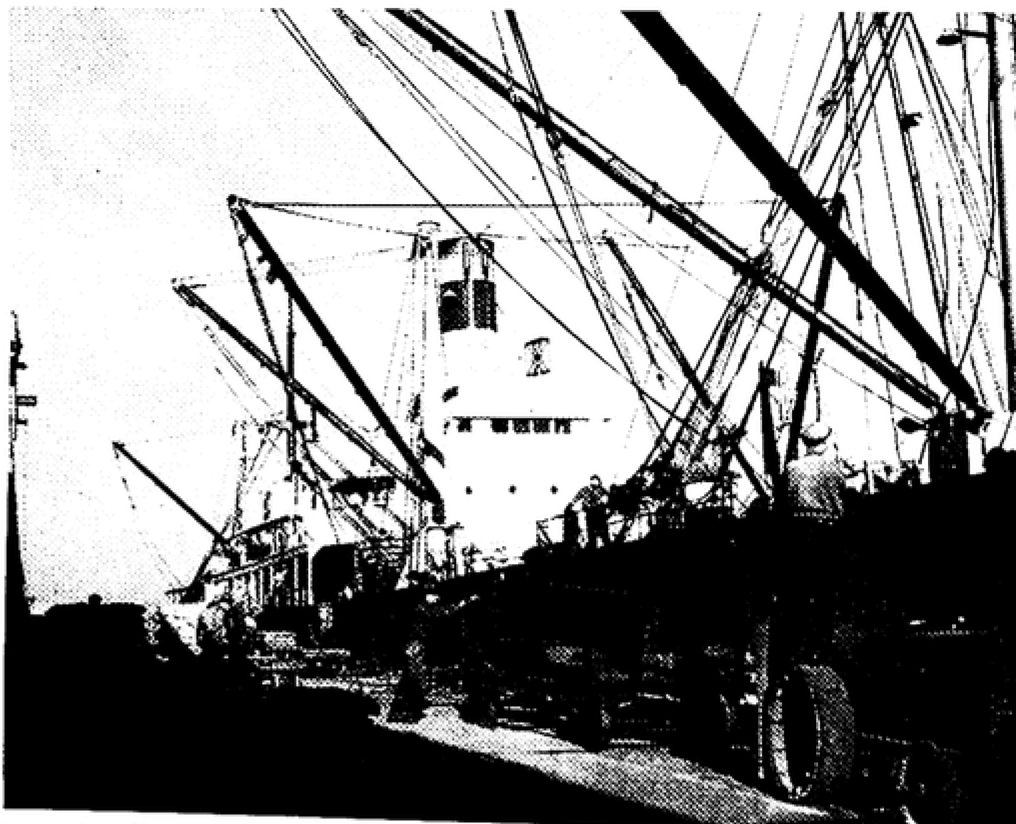

Figure 10.—Ship's gear consisting of masts and kingposts handling diversified general cargo. Here structural steel is shown arriving, while bagged borax and fertilizer are being stowed aboard.

The term "ship's gear" is used to describe the ship's deck winches, its cargo booms attached either to masts or kingposts, and the ropes or falls used in connection with the booms and winches for hoisting or lowering drafts of cargo (figs. 10 and 11).

A winch is a hoisting machine equipped with one or more horizontal drums, around one of which is wound the wire or manila rope or fall (also called cable or whip) with a hook attached to its end used for lifting and lowering cargo. One end of the fall is tended by a man, sometimes called the "drum-end man," but more usually the man who tends the gypsy-head, and is passed by him around the end drum, or gypsy-head, of the winch. He varies the number of turns of the fall around the drum largely in accordance with the weight of the load

being handled. The heavier the load, the greater the number of turns required to provide the needed friction to keep the fall from slipping around the drum and losing its purchase.

From the drum, the fall usually leads upward to a block attached to or near to the heel of the cargo boom served by the winch. Passing

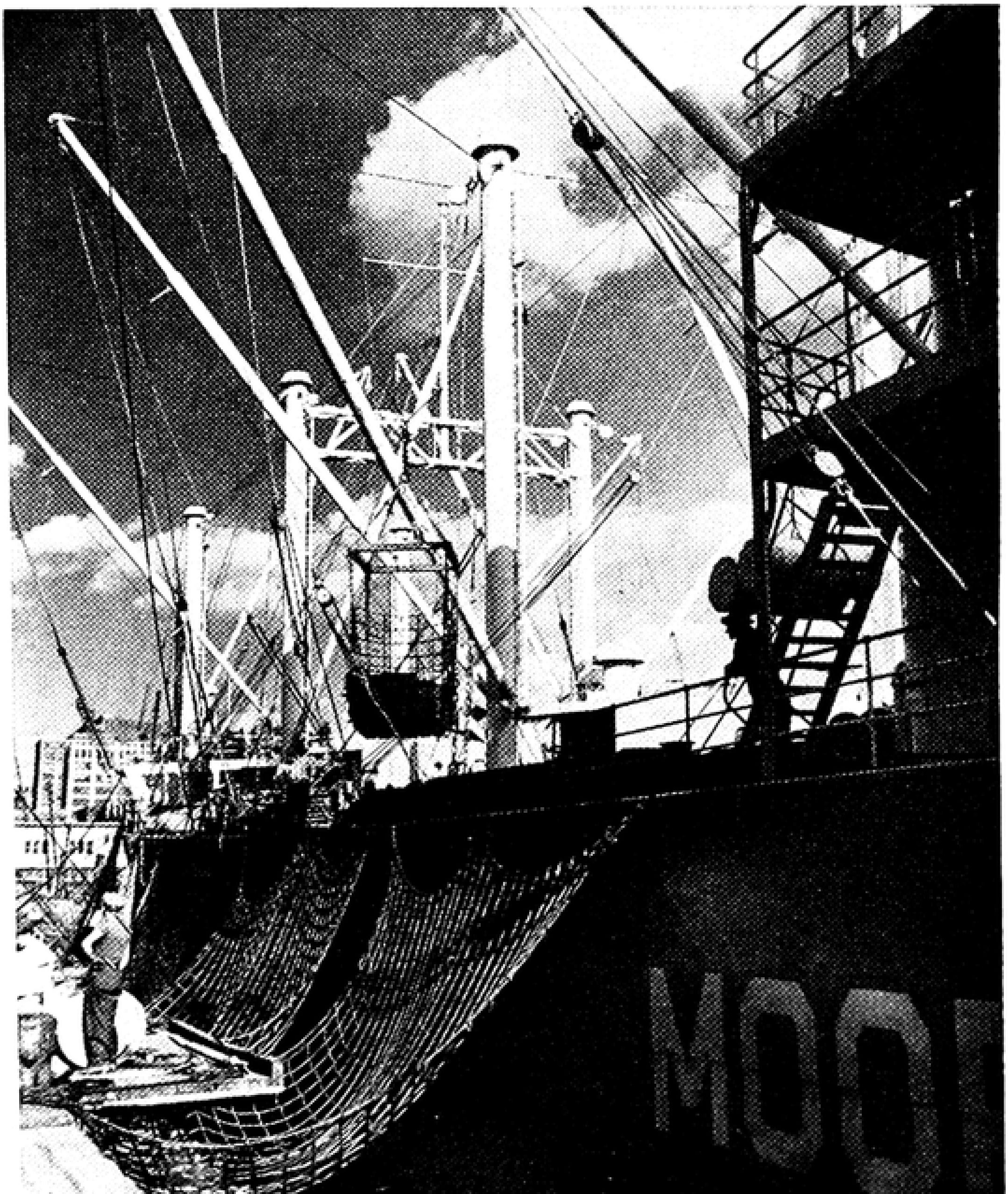

Figure 11.—Ship's gear on one of the new Maritime Commission ships.

through the block, the fall extends along the under side of the boom to a second block attached to the outer end or peak of the boom. It passes through this block and, when the boom is hoisted into position to handle cargo, the fall drops vertically from the second block, either into the hatch opening or onto the apron of the dock, depending

upon the position of the boom. Sometimes the fall runs from the drum of the winch to a block fastened to the deck, and from it to the peak of the boom.

Winches may be driven either by steam from the ship's boiler room or by electric motors. Many improvements in design and construction

Figure 12.—The winchman.

have been made in recent years. Weight has been reduced by the use of steel plates instead of cast iron for the base and by the employment of electric welding. Moving parts have been enclosed to a greater extent to reduce the possibility of injuries to the operator, and rope guards have been provided to keep the fall from becoming loose and

interfering with the smooth operation of the winch. Speeds of operation and lifting capacity have also been increased in many cases.

Careful operation of winches by experienced men is most desirable in order to avoid unnecessary strains that may cause breakdowns and repair bills (fig. 12). This is a matter which ship's officers should watch, and, if the stevedore's men at any port mishandle the ship's winches, they should be replaced by more experienced men.

One source of trouble with careless operators is that, when starting to hoist a load, they may run the winch at full speed with slack in the fall or runner. When the slack is taken up there will obviously be a heavy jerk that will impose a sharp, heavy strain on all the gear involved—winch, fall, blocks, and booms. Another cause of trouble

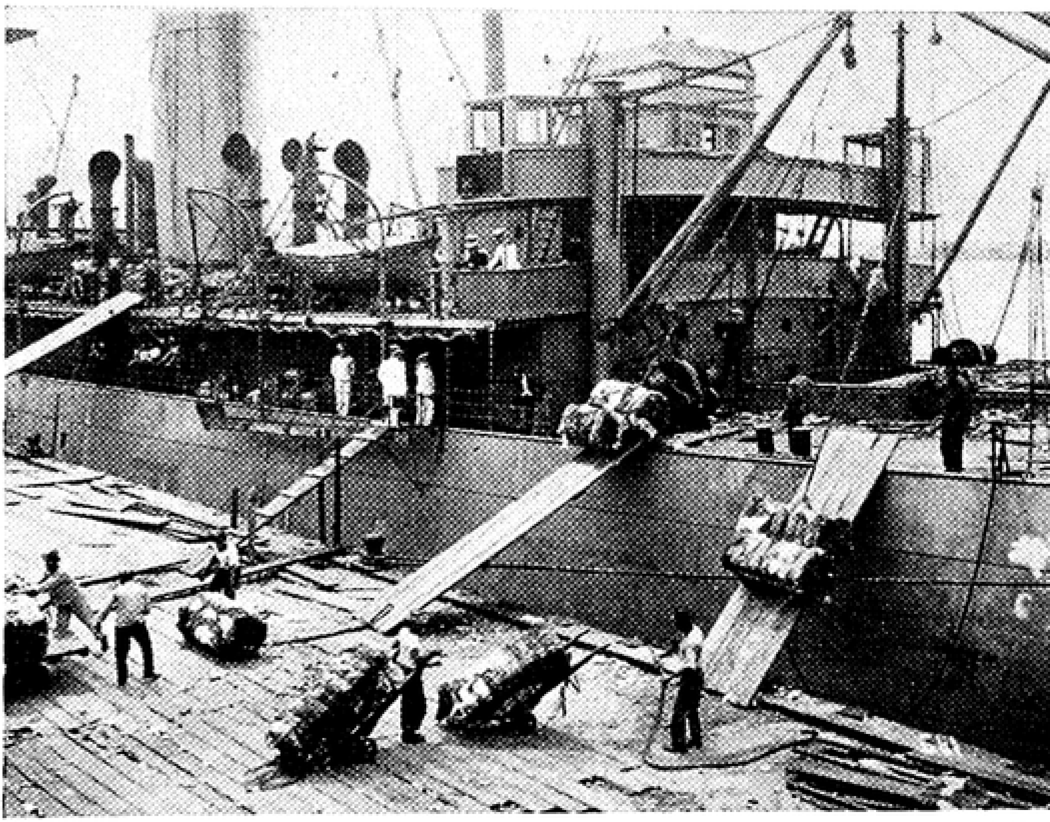

Figure 13.—The whip (or single-fall) and skid system being used for loading cotton at New Orleans.

is the sudden application of the winch's foot brake while a load is being lowered. This is often done and always causes a jerk and a sudden, heavy strain. The "whipping" caused by cross breaking or bending stresses—especially when the boom is slung outboard—is increased when the inevitable jerks, due to the cranks of the winch, synchronize with the natural vibrations of the boom. The careful, experienced winchmen will watch for such excessive vibrations and will slow down the winch until vibrations have spent themselves.

WHIP (OR SINGLE-FALL) AND SKID SYSTEM

The simplest method of using ship's gear for loading cargo is to employ one winch and one boom with its attendant fall, together with an inclined skid leading from the pier to the deck of the ship (fig. 13).

The boom is placed so that its peak or outer end is directly over the hatch opening. When the cargo draft or sling load is made ready on the pier it is brought to the foot of the skid, and the hook on the end of the fall is hooked onto the draft. The winch is then started and the draft is dragged up the inclined skid and over the bulwarks. It then swings over to the hatch by its own weight. The winch is reversed and lowers it into the hold. To prevent the draft from swinging from side to side a worker on the deck of the ship steadies it by means of a rope attached to the hook, or by a guide line thrown around the fall just above the hook. When the draft is landed in the lower hold or 'tween decks the hook is released; the deck man pulls it up by means of the guide rope, and throws it back to the pier for the next draft.

With seasoned workers, considerable speed can be attained in loading cargo by this method, which at some ports is called the "whip," and at others the single-fall and skid system. It is only suitable for loading, and is likely to damage many classes of cargo. The method is widely used for loading cotton at New Orleans and other southern ports and has proved satisfactory for this purpose.

THE DOUBLE-WHIP OR SPLIT-FALL SYSTEM

A somewhat faster way of working cargo is provided by the "double-whip" or "split-fall" system, which is extensively used at United States and European ports. Two booms and two winches are employed, one boom extending over the hatch opening, the other over the apron of the pier. In loading, the draft is lifted from the pier to the deck of the ship by the boom and fall extending over the pier. As soon as the draft is landed on the deck the hook is released and thrown back on the pier. The hook attached to the other fall is then hooked onto the draft, which is lifted clear of the deck, swung over the hatch opening, and then lowered into the hold. In discharging, the movements are reversed.

This system is widely used for the handling of bagged cargo, also for copper ingots, pigs etc., and many steamship companies have found it the most rapid and satisfactory method of working miscellaneous general cargo. The port captain of one of the long-established American steamship lines states that, in his experience, this system will handle five sling loads of cargo in the same length of time that three sling loads can be handled by the "married-fall" system.

THE BURTON SYSTEM

In the so-called "burton system," the "burton man," as the deck man is usually called, throws the hook of the second fall (attached to the boom over the hatch opening) around the first fall (attached to the boom extending over the pier), and thus unites the two falls while the draft is being lifted from the pier. The fall serving the pier is called the burton fall. The draft is raised above the bulwarks and is moved athwartship and down through the hatch opening by the joint action of the two winches. Just before the draft is about to be lowered through the hatch, however, the burton man releases the hook of the pier fall and throws it back to the pier for another load. In discharging, the movements are reversed.

THE UNION OR MARRIED-FALL SYSTEM

The union or married-fall system is the one most commonly employed for both loading and unloading cargo with the ship's gear. It is sometimes called the "yard-and-stay" system, and in England is referred to as the "union-purchase" system. It is also referred to as burtoning. Two cargo booms and two winches are employed (fig. 14). One boom extends over the hatch opening, and the other is swung out so that its peak is over the apron or edge of the pier. The ends of the two falls are brought together and terminate in a single hook.

In loading cargo, the fall operating from the boom over the ship's side lifts the draft to a point above the ship's bulwarks. The fall

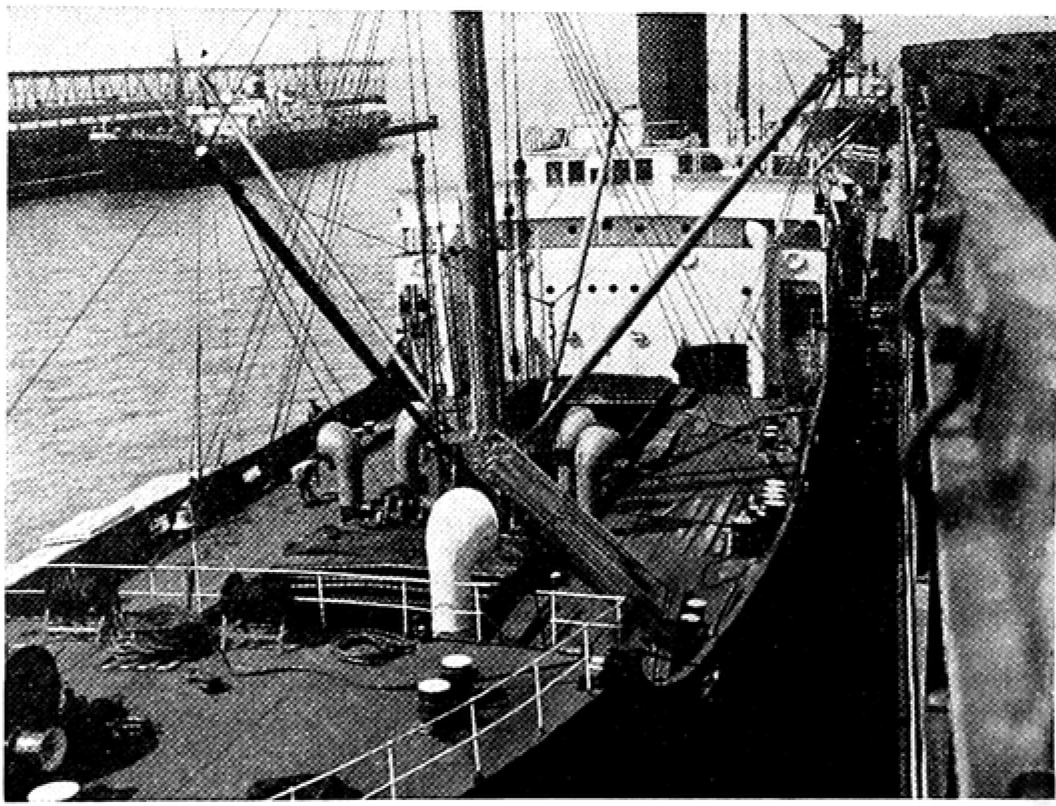

Figure 14.—The union or married-fall system transferring cargo athwartship from pier to hatch opening.

on the boom over the hatch is then taken up on its winch, while, at the same time, the other fall is slacked away. This joint operation brings the draft over to a point above the hatch opening. Both winches are then reversed and the draft is lowered into the hold. When discharging cargo, the movements are reversed.

This system is used in nearly all United States ports, but is, perhaps, most commonly employed at west coast ports. In many cases, the two winches are operated by one man, and the three movements involved—lifting the draft from the pier, swinging it over above the hatch, and lowering it into the hold—are carried out so smoothly and rapidly that they are practically merged into a single continuous movement.

SHIPS' DECK CRANES

Some ships, though relatively few in number, are provided with power-driven revolving cranes that are installed on deck between the hatch openings and the bulwarks, usually near the corners of the hatch openings. In certain cases, such cranes are useful adjuncts to the ordinary ship's gear, but they are somewhat expensive to install and occupy a certain amount of useful deck space. Generally, they are fitted on more or less specialized ships, such as coasting vessels that are fitted with hatches and other ships that make short-distance voyages. Frequently they serve only one or two hatches, such as those closest to the amidships superstructure, while the ship's booms

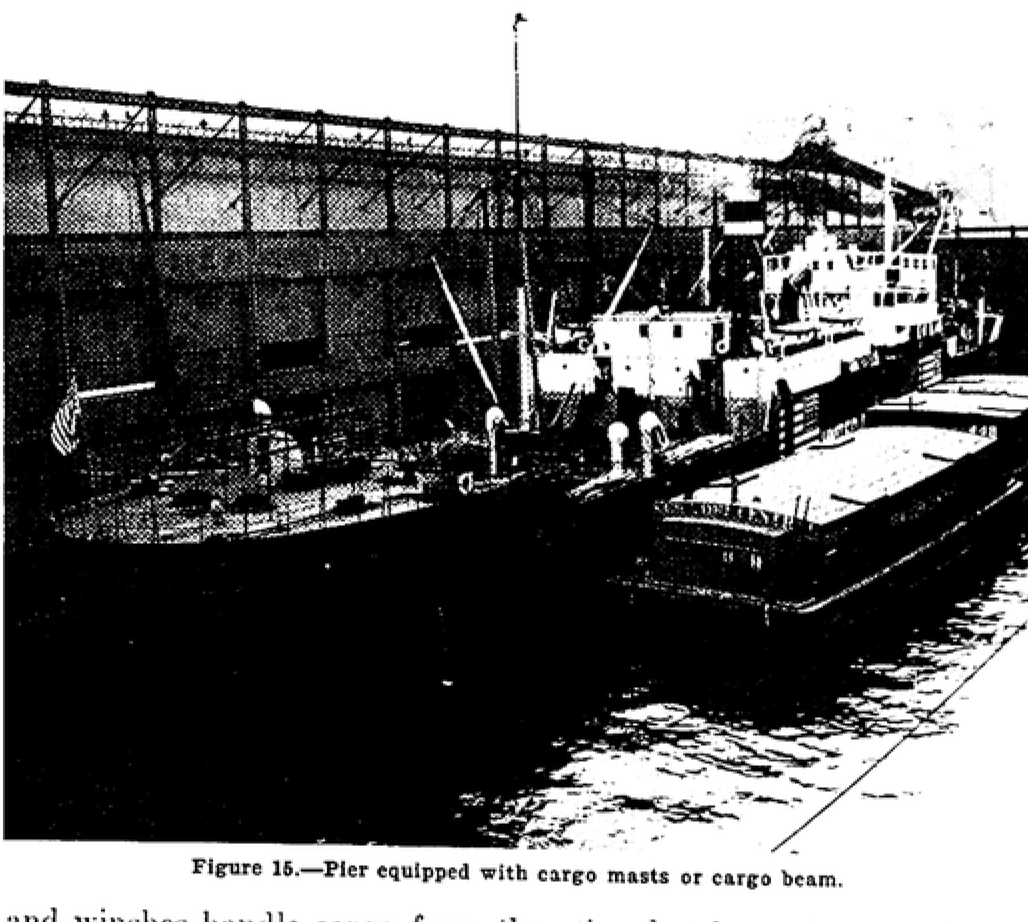

Figure 15.—Pier equipped with cargo masts or cargo beam.

and winches handle cargo from the other hatches. A type of deck crane in common use is one that has a 2-ton lifting capacity and a radius of about 20 feet.

TRANSFER BY SHIP'S GEAR AND CARGO MASTS ON THE PIER

A number of piers in United States ports are provided with cargo masts or cargo beams (fig. 15) to facilitate the loading and unloading of freight. These are usually strong metal masts, erected near the edge of the pier or against the outer face of the pier shed, and connected with one another near their peaks by means of steel beams or girders. The tops of the masts are generally about 60 to 80 feet above the mean low-water level. A catwalk runs along the entire

length of the structure, close to the beams. From this catwalk, workers can shackle stirrups to which blocks are attached in holes that are conveniently spaced at 2- or 3-foot intervals in the beams.

A fall or whip passes through each block. One end of the fall leads downward to an electric winch on the pier. The other end of the fall is usually "married" or joined to the end of a fall operated by one of the ship's booms and winches. Thus, drafts are loaded or discharged by the joint operation of the pier winch and one of the ship's winches. There are three movements, which are the same as those involved when the union or married-fall system is employed, using two ship's booms and two ship's winches. When loading, the draft is lifted from the dock by the pier winch. The ship's winch then moves the draft inboard, while the pier winch at the same time slacks away. The draft is then lowered through the hatch opening by the ship's winch, operating in reverse, the pier winch slacking away simultaneously. In discharging, the movements are reversed.

One of the advantages of using cargo masts in conjunction with the ship's gear is that only one ship's boom is required at each hatch for loading or discharging. As a consequence, the second boom and winch can be used, if required, for handling cargo to or from lighters lying alongside. In some cases, two pier winches are used to operate both the fall and the burton for cargo being transferred to or from the pier, and, when this is done, the ship's winches are left entirely free to be used to handle lighter cargo. The cargo mast also makes possible a wider range of action than the ship's gear alone. For example, cargo can be transferred between ship and pier, even if the ship is separated from the pier by lighters, loaded either with bunker coal, fuel oil, or cargo. Furthermore, cargo masts are of value on piers that have two stories or decks, on both of which cargo is stored. With the aid of a cargo mast, freight can readily be transferred directly between the second story and the ship's hold, thus eliminating a great amount of handling. Cargo masts also make it possible to handle long steel and similar cargo more safely and more economically when a ship is equipped with short booms.

On many of the older piers in some United States ports the apron or stringer is so narrow that when ship's gear alone is used there is continual danger that sling loads of cargo being discharged will swing out and strike the wall of the pier shed, possibly damaging some of the goods. The use of a cargo mast eliminates this hazard to a very large extent. Also, when it is raining, it is much easier to land cargo directly inside the pier shed, protecting it, with a cargo mast rather than with ship's gear alone.

TYPES OF SLINGS

For many years the most common device used for making up drafts of cargo to be loaded or discharged was the rope sling. However, in recent years, a number of other types of slings have been developed to simplify and expedite the transfer of cargo and at the same time reduce the amount of damage occurring during the transfer from pier to ship or vice versa.

Rope sling.—Frequently used for drafts of boxes, bales, barrels, etc. (fig. 16). It is made from a length of rope, usually between 12 and 24 feet long, with the ends spliced together to make it end-

less. The sling is laid on the floor of the dock or the ship's hold and the cargo is then piled on it to a convenient size or weight, usually from 1,000 to 1,500 pounds. Care is taken to have one end of the sling considerably longer than the other. The long end, called the "rove," is then passed through the shorter end, which is known as the "bite." The rove or long end is put on the ship's hook and, when the draft is lifted so the sling is taut, a longshoreman drives the bite down tight on the rove with a piece of dunnage or a short piece of pipe kept at hand for this purpose.

Wire slings.—Of the same design as rope slings, and are sometimes used for heavy packages, such as boxed automobiles or machinery. Frequently two slings are required, one around each end of the con-

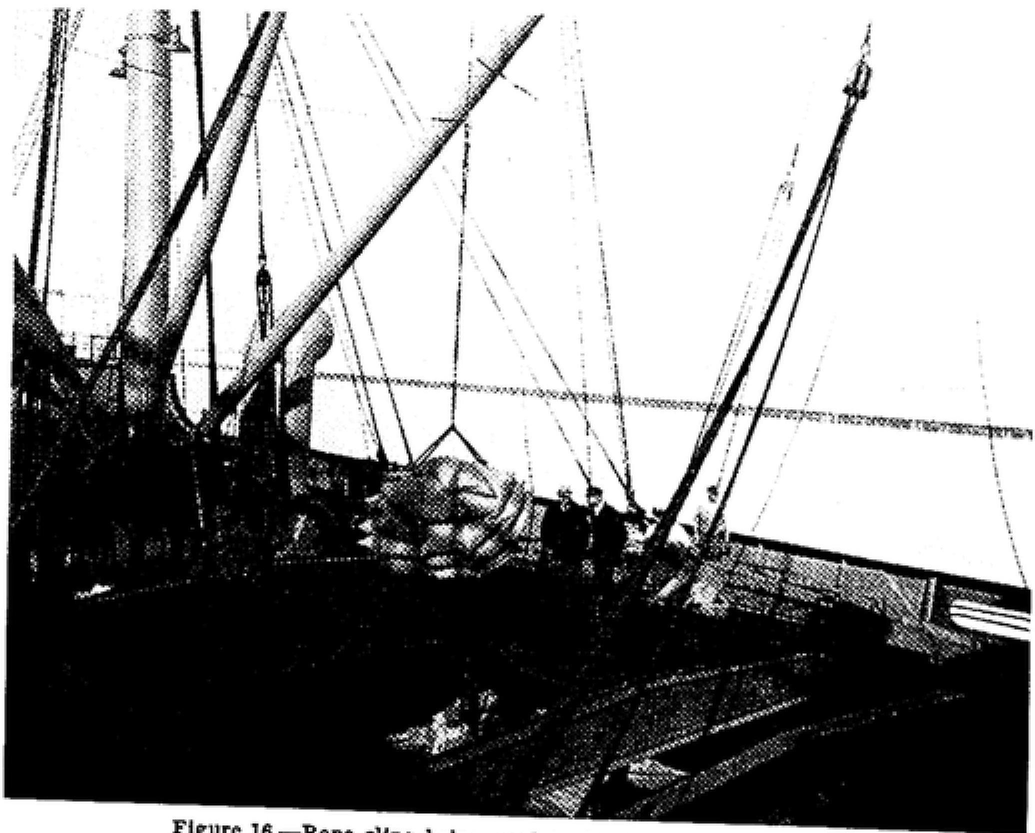

Figure 16.—Rope sling being used to discharge bagged coffee.

tainer, the upper loop of each sling being looped over the hook of the fall.

Web sling.—A rope sling of which the central portion, perhaps two-thirds of the total length, is "webbed" or fastened together by a piece of strong canvas. The ends of the sling are left open to serve as rove and bite in securing the load and fastening it to the hook. Web slings are used for hoisting sugar, flour, coffee, and similar merchandise packed in bags that might be cut or burst open by the pressure of an ordinary rope sling.

Net sling or cargo net.—A rope net usually about 8 or 10 feet square. Larger nets, measuring 15 feet square, are used for handling mail. The net is spread on the floor of the pier or the ship's hold, cargo is piled on its center, and the corners of the net are then

gathered together and fastened to the hook. Net slings are used for small packages of miscellaneous sizes and shapes. These should have sufficient strength to resist the pressure of one package against another, which is inevitable when the corners of the net are drawn together and the draft is raised or lowered.

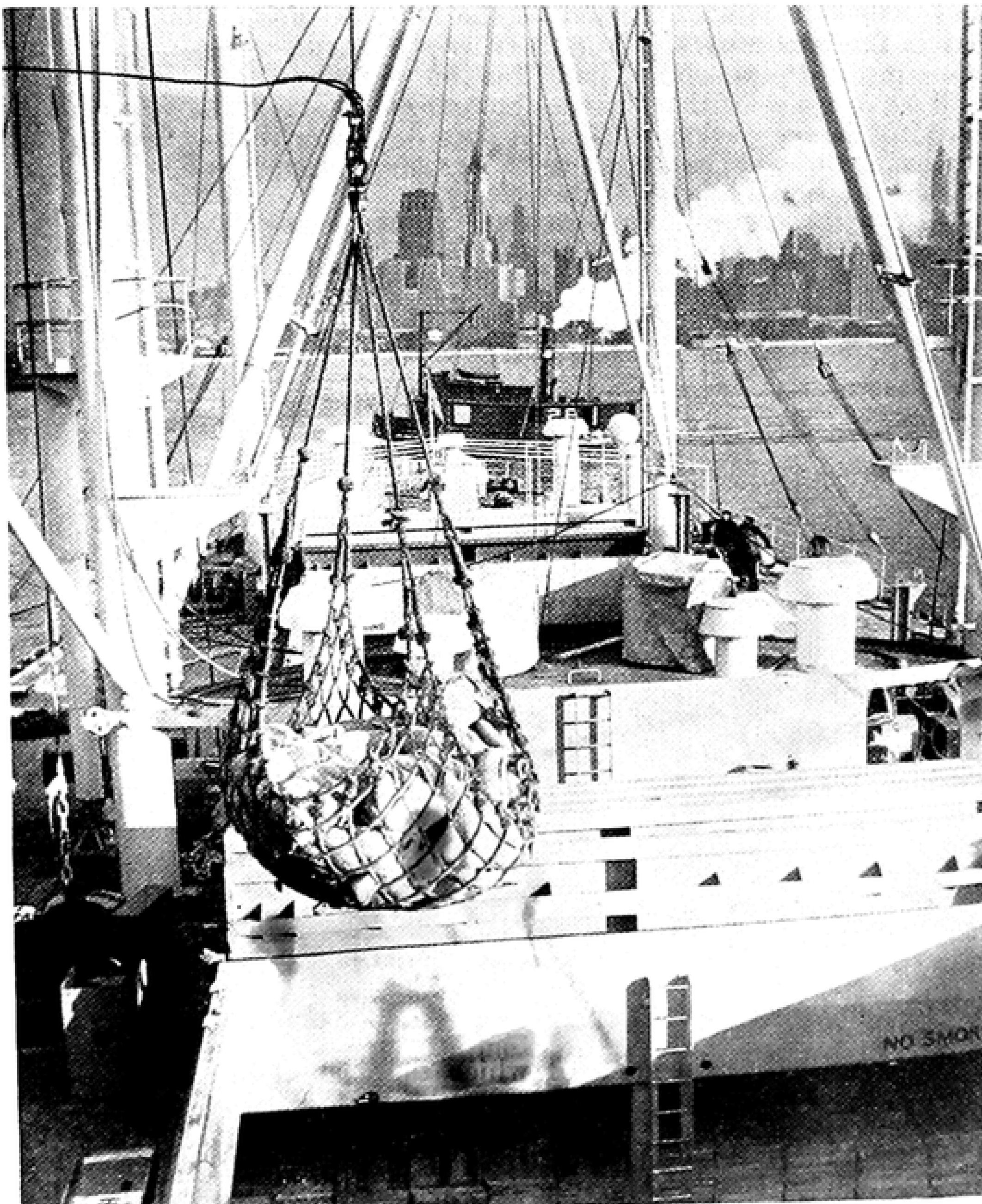

Figure 17.—Cargo net being used to transfer bagged cargo.

Cant hooks.—Chiefly used to handle barrels (see fig. 18). Usually consist of four hooks arranged in pairs. Two barrels are lifted at one time, one hook at each end of each barrel. Cant hooks are sometimes used on wooden boxes, but they are not to be recommended

for this purpose. There is too much danger of the hooks loosening or pulling off the cleats of the box beneath which they are hooked.

Chain slings.—Frequently used for transferring such products as pipe, rails, and structural steel (fig. 19). A single chain sling consists of a length of chain with a ring at one end and a hook at the other. The chain is passed around a bundle of pipe or similar material about one-third of the distance from one end, and the hook is caught around the standing part of the chain. The ring is then placed on the hook of the fall and the load is hoisted. The pipes hang almost perpendicularly and, in this position, can be lowered into the hold and swung toward the stowing point more easily than if they were in a horizontal position.

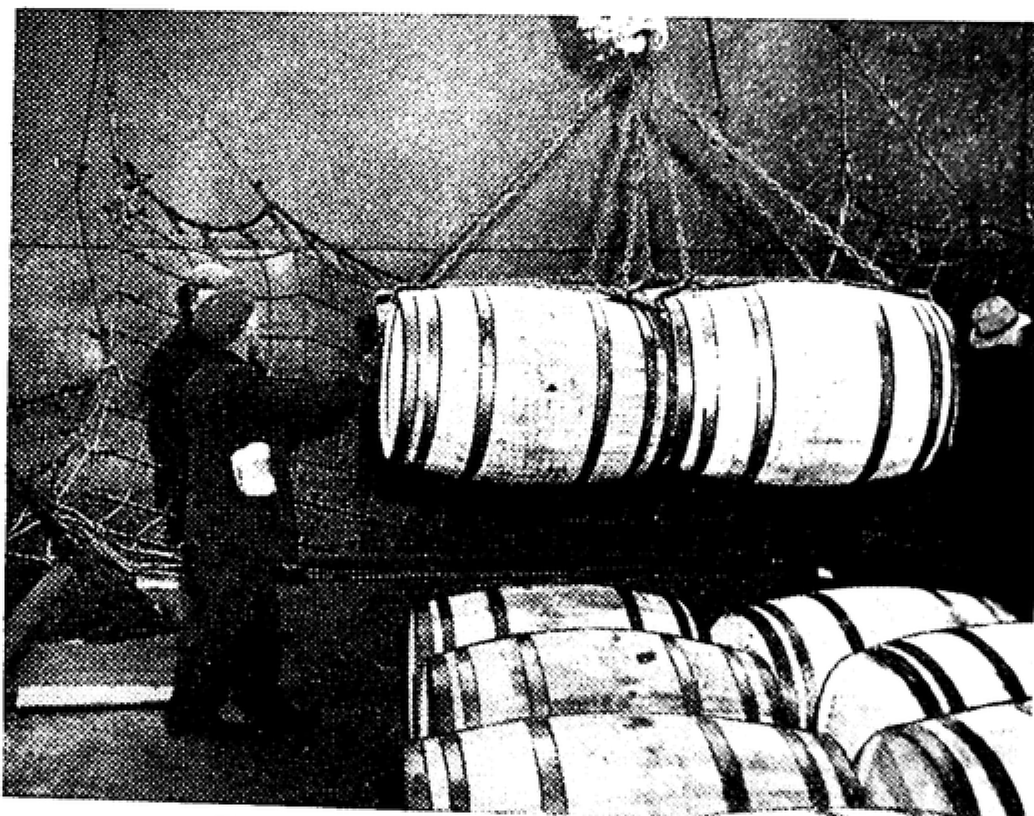

Figure 18.—Cant hooks being used to transfer barrels.

Double-chain slings.—Sometimes used for handling heavy, relatively short pipes and similar materials. In a double sling, there is a single ring to which are fastened two chains. A hook is forged to the free end of each chain. The chains are passed around the draft, one close to each end, and each hook is then caught around the standing part of the chain to which it is attached.

Airplane, tray, or platform slings.—Have been widely adopted in recent years by many steamship companies and stevedoring organizations. Consists of a wooden platform to the corners or sides of which are fastened rope or wire bridles through which the hook of the fall may be passed (fig. 20). To prevent the crushing of boxes or other containers by the bridles, wooden spreaders are fitted to keep the ropes or wires in each bridle apart. In other slings of this type two pieces of angle iron with rings, through which

the ropes of the bridles can pass, are attached to each bridle. When the sling is loaded, the angle irons are placed on the upper corners of the containers on the top of the draft, holding the packages firmly in place and distributing the pressure of the bridles over a large surface.

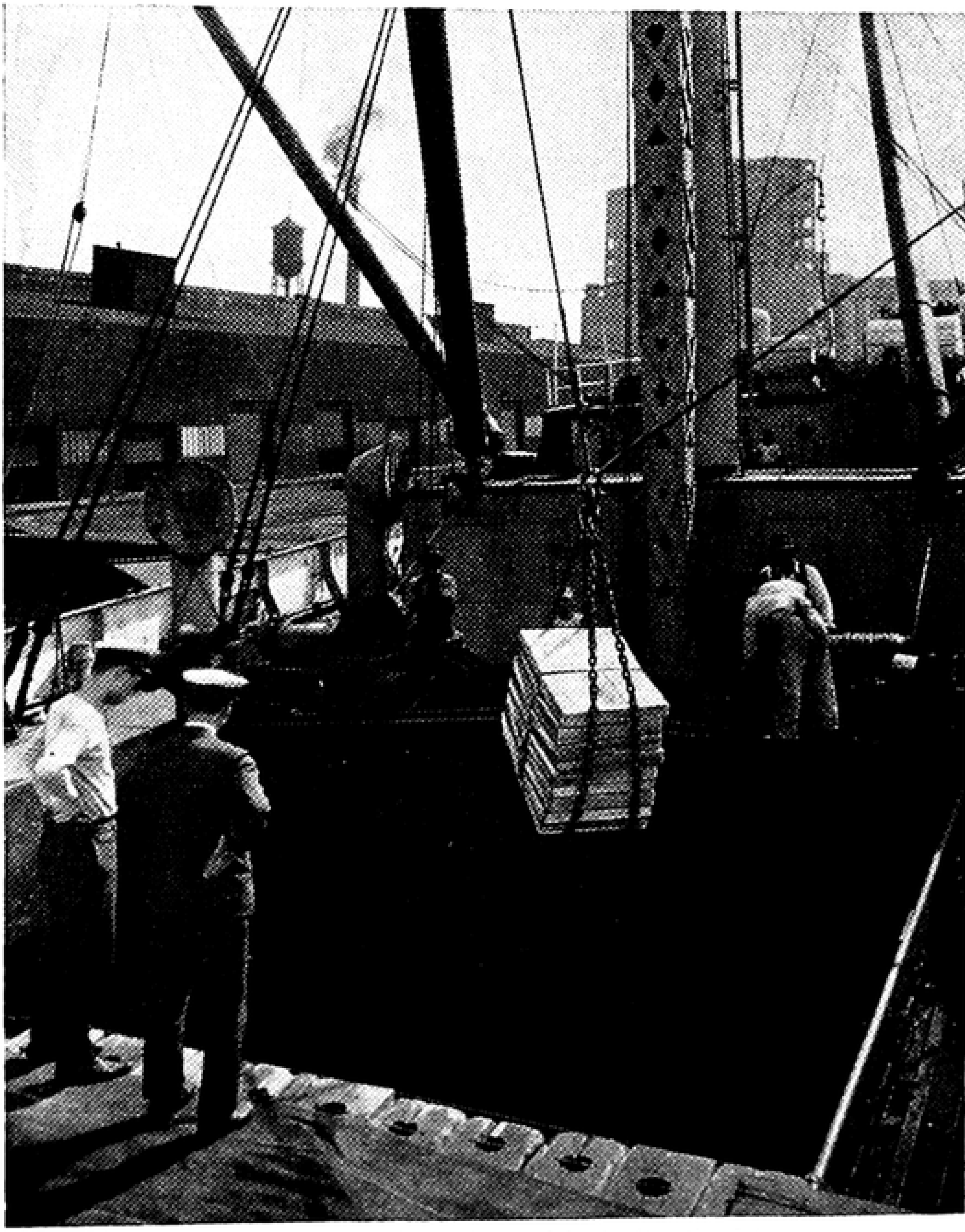

Figure 19.—Chain sling being used for loading tin plate.

Trailers, skid platforms, and pallets.—Frequently used as platforms in the transfer of cargo from pier to ship. When these pieces of equipment are used, they are usually fastened to the hook of the fall by means of two stout wire or rope slings, one passed under each end of the load.

ECONOMIES EFFECTED BY USE OF SPECIALLY DESIGNED SLINGS

The results obtained by one well-known American steamship company by developing and applying suitable specially designed slings for loading and discharging its foreign-trade vessels are worthy of note. During a period of about 5 years, nearly 20 pieces of equipment, all simple in construction, were developed and put into use. The employment of these aids to cargo-handling, according to the company, reduced claims for damage to import and export freight more than 75 percent, and reduced time of loading and unloading nearly 50 percent.

Prior to the introduction of its new equipment, the company had used rope slings for most of its loading and unloading operations.

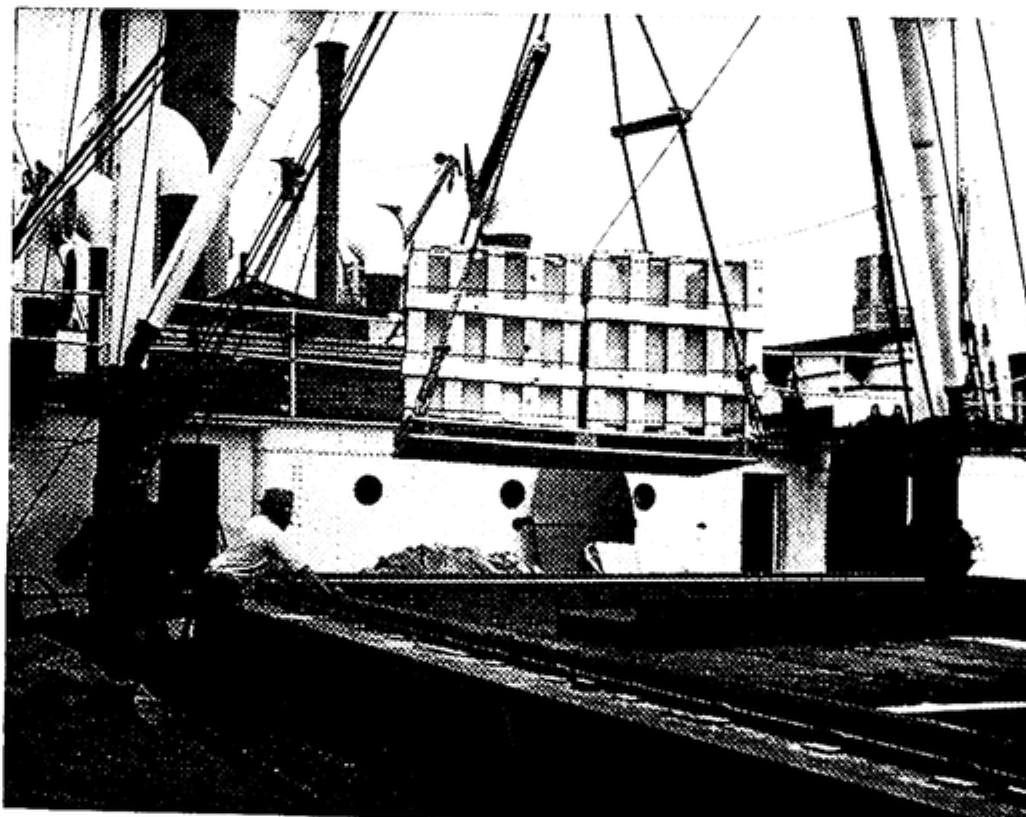

Figure 20.—Airplane or platform sling.

This method resulted in considerable damage to all soft-package shipments, such as flour, sugar, soda, coffee, and other commodities packed in bags. Unavoidable slipping of the sling also frequently released barrels, boxes, and other hard packages, allowing them to fall to the apron of the dock or the deck of the ship. Pipe, sheet and structural steel, glass, and similar products were also injured by the slings and, even when successfully handled, worked a hardship on the stevedores, both on the dock and in the holds.

One of the greatest losses in time and money resulted from the handling of bagged cargo in rope slings. To overcome this, a platform sling was developed, which consisted of three long planks and two short transverse ones. This platform is fitted either with metal eyes to engage four hooks attached to the lifting tackle or with two

permanently attached bridles. The platform is 5 feet long and 2 feet 10 inches wide. Movable spreaders made of narrow board are placed on the slings at each end to keep the ropes apart and thus lessen twisting, as well as reduce pressure on the load.

With this platform the weight is well distributed over all the lower layer of bags, instead of being forced down on the bottom one or two bags, as when a rope sling is used. The platforms are placed on platform trucks, rolled to the stack in the warehouse or on the dock, the bags piled, and the truck sent to shipside, where the lifting tackle picks up the sling and moves it inboard at about twice the speed possible when handling a simple rope sling. Sugar, coffee, soda ash, salt, beans, potatoes—in short, practically all bagged cargo is loaded and unloaded with these platforms, which are also used for plate glass in small sizes, and other commodities. It is stated that damage to bagged cargo has been reduced about 40 percent, and the quantity lifted at each movement increased approximately 30 percent.

If the sacks are larger than usual, or the commodity much heavier than usual, "wide-board" slings are used. These are platforms made of three wooden strips, each 7 feet long, 4 inches wide, and 2 inches thick, with similar strips, 3 feet long, bolted across at each end and in the middle. With these, 9-foot wire bridles are used, which carry wooden spreaders 3 feet long, that is, with a length equal to the width of the platform. In addition to bagged cargo, these slings have been found of value in handling canned goods and other case goods.

These slings not only are easier and faster to load in the warehouse or on the dock, but they can be handled more rapidly by the ship's gear because there is little danger of slipping, and twisting is largely eliminated. Also they are more easily and more rapidly unloaded when they reach the floor of the hold. There they can be either dropped flat on the floor or set on dollies to be run to any part of the hold for stowing.

For the handling of cement and wet salt, boards 4½ feet long, 1 foot 10 inches wide, and 2 inches thick, with 2-inch cleats the full width of the under side at each end, are used. These have 5-foot wire-rope bridles, brought together so that the ship's hook engages a loop in each at the top. In these platforms the floor boards are placed close together, and they are handled on small four-wheeled platform trucks, which can be drawn by one man or pulled in a chain by a tractor.

Another solid board platform is the so-called "soda-ash" sling, 5 feet 4¼ inches long, by 2 feet 5 inches wide, and equipped with equal-length wire rope bridles, 6 feet long, anchored into the four corners and meeting in two loops at the top, so the ship's hook can engage them easily. Heavy loss was sustained annually by the steamship and warehouse companies moving soda ash, because of the breakage under the old method of using rope slings. More than this, the ash, falling on the steel sides and deck of the ship, injured the metal as soon as it became wet.

One of the larger platform slings of the airplane type used in the handling of general cargo, and especially of large packages, furniture, stoves, and similar commodities, consists of a platform made of five longitudinal strips, each 6 feet 5 inches long, 4 inches wide, and 2 inches thick, bound together by two cleats, each 4 feet 4 inches

long, 4 inches wide, and 2 inches thick. Around this platform runs a rim, 3 inches high and 2 inches thick, held in place with iron clamps placed at frequent intervals. Wire rope bridles, 8 feet long, are attached to the sides, about 15 inches from each end. These platforms are carried on large, flat hand trucks or dollies, especially devised for their transportation, and move approximately twice the amount of general cargo that can be handled in the same length of time when rope slings are used.

Larger, and also smaller, sizes of this type of platform were built by the steamship company in question, but experience showed that the particular dimensions cited were best adapted to the widest variety of cargo.

Short lengths of structural steel, short pipes, water-heater tanks, tubing, round tiling, and similar commodities also can be handled on this sling, as well as packaged goods of all kinds. Owing to the placing of the bridle-ends well back from the ends of the platform, there is no weakness in the middle, in spite of the length of the platform. Barrels that bulge at the middle, such as those used for molasses, wine, sugar, or barreled china and glassware, are placed, three at a time, on one of these platforms and transferred to the hold or 'tween decks. With a rope sling or cant hooks, only one or two barrels could be handled at a time. Obviously, whenever one operation transfers three times as much cargo as was previously possible, time of loading and unloading may be materially reduced.

For metal drums, such as those commonly used for gasoline, kerosene, oils, and paints, another special platform sling has been devised. This consists of a solid platform 7 feet long, 1½ feet wide, and 6 inches thick, with three cross-cleats, 6 inches wide and 2 inches thick, on the bottom. This carries 8-foot wire rope bridles. On the platform, cylindrical drums, that do not bulge at the center, can be laid on their sides, one deep, for as many as will fit the length of the sling, which is usually four. These drums were formerly handled one at a time, or at most, two at a time.

The flat trucks used in handling these various platform slings are 5½ feet long by 2 feet 3 inches wide, and stand about 18 inches high. They have four heavy wheels, two of which are rigid, the front pair working on a turntable beneath the truck floor. A long metal tongue enables the operator to handle the truck easily; and the tongue is detachable so that the trucks may be hooked up in series to a tractor or other motive power. A great deal of study was given to the height of the trucks and many heights were tried—from 3 feet down to a few inches, the result being the 18-inch height just mentioned. One of the advantages of the low, wide-wheeled, flat-platform truck, the company states, is that it can be used in the hold of the ship with as great facility as in the warehouse or on the dock.

The handling of iron and steel products, particularly large pieces of sheet iron, always has been a problem to the ship operator. The company in question developed a method that has proved very satisfactory. For large and thick sheets, "alligator tongs" are used, with the addition of an ice-tong principle, which makes it possible for one man to apply the tongs in such a manner that the sheet can be lifted from a flat position on a pile, either on the dock or in the ship's hold.

For smaller and narrower pieces of steel and iron, "side dogs" with rings through which a moving chain passes are used, the whole being hooked to the ship's tackle.

For still smaller pieces, for structural steel of short lengths, and for other similarly heavy and hard commodities, two special platform slings were devised. The larger of these, known as the "sheet-iron board," is 9½ feet long by 4 feet wide, and is made of three longitudinal strips, each 6 inches wide by 2 inches thick, fastened together by four cleats, each 4 inches wide and 2 inches thick. One of these cleats is bolted on, transversely, at each end. The other two are set in the same manner about 1 foot in from each end. Rings at the ends of these inner transverse bars engage 10-foot wire rope bridles. Sheet iron up to 3½ feet in width can be handled easily and quickly on this type of sling, a number of sheets at a time, where only one at a time can be picked up by alligator tongs.

A narrower "sheet-iron board," built the same way, but 12 feet long by 2 feet wide, also is used for small strips of sheet iron, short lengths of structural steel, reinforcing steel, pipe, tubing, and similar metal shipments.

For large and bulky packages of light weight, such as cotton waste, sacked and baled paper, empty cartons, and so on, another large board is used, somewhat of the same design as the large sheet-iron board. It is 9 by 4 feet, with 10-foot wire rope bridles, held apart by 4-foot spreaders. Ten large bales of cotton waste can be handled at a time, as compared with two, or at most three, with a rope sling. Baled cotton is also loaded and discharged with this device, three to four bales being handled at a time, as compared with one when a rope or canvas sling is used.

For iron pipe in long lengths, the narrow sheet-iron board, 12 by 2 feet, is used as a sling. As a complement to the sling, a special pipe truck, with a flat bed, operated by one man or by a tractor, is employed. This truck has a bed 7½ feet long by 4 feet 2 inches wide, made of 8-inch by 8-inch timbers, with chocks and movable iron pins at each corner, to prevent the pipe from rolling off. The truck also can be used for handling hot-water heater tanks, small boilers, large tubing, and other materials of this class. The truck has four wheels, the forward pair turning beneath the body, so that the vehicle can be turned in its own length. Pipe can be laid on the narrow sheet-iron board placed on top of this truck, or can be picked up with a chain sling with two loops, according to how the operator prefers to handle it. The board, however, has several advantages, including elimination of much of the twist and sway, and ability to make a better landing in the hold.

A newsprint sling (fig. 21) has been developed which lifts the large and heavy rolls of paper evenly off the warehouse or dock floor or the truck or car platform, without damaging the edges, and sets them down in the same manner. Two rolls are handled at a time, with a loop around each, the lifting line running up between the two, so that the weight is distributed evenly. Prior to the introduction of this simple device, much damage was caused by the pick-up of newsprint rolls from one edge, or letting them down on one edge. Similar slings have been devised for handling large objects, such as transformers, weighing 6 or 7 tons, cement mixers, and other portable machinery weighing from 10 to 17 tons.

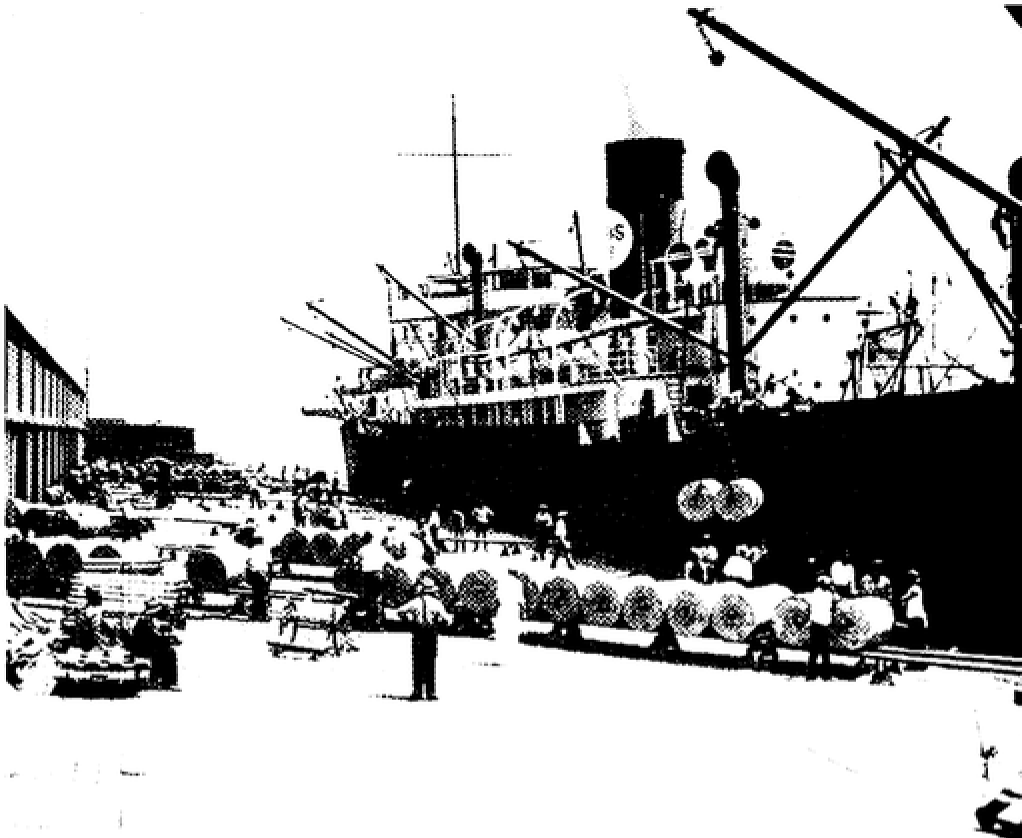

Figure 21.—Special sling for handling rolls of newsprint without damaging the edges of the paper.

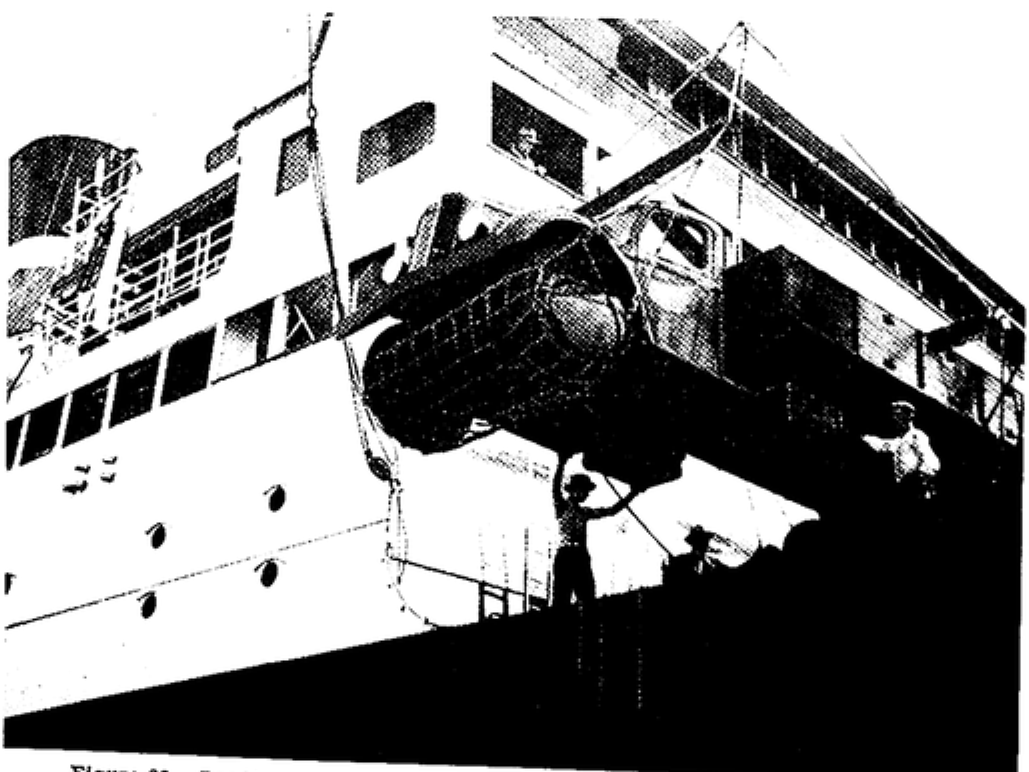

Figure 22.—Loading an auto truck, using net slings under front and rear wheels.

Unboxed automobiles are handled today at many piers by means of two strong rope nets, each measuring about 6 feet long and 30 inches wide (fig. 22). One net is passed underneath the automobile at a point just behind the front wheels, and the other net is passed underneath at a point just forward of the rear wheels. In some cases, the nets are passed under the front and rear wheels. Wooden spreaders keep the nets from closing in against the automobile while it is being lifted.

A special wire rope sling is also used at some piers. This sling ends in four large, flat hooks, the inner surfaces of which are curved to engage the curved inner surface of the felloe on the automobile wheel. These hooks are slung under each wheel of the vehicle, and the car is lifted to its place on the deck or in the hold. Each sling has a set of hooks for the different sizes and weights of motorcars and trucks, as well as a heavier set for tractors. For trucks, the sling may consist of 16-foot wire rope bridles, with flat hooks, and 7-foot wood spreaders. Similar bridles, with longer spreaders, are used for handling passenger cars, so as to avoid scratching. No spreaders are used on the tractor slings, which, as a rule, are hooked under the axles.

IMPROVEMENT IN SHIP'S CARGO-HANDLING FACILITIES

Very important advances have been made in recent years in the construction of ships and in the character of their cargo-handling facilities to promote speedier loading and discharging and reduce the ship's time in port. These improvements include the enlargement and widening of hatches, the lengthening of cargo booms, increased power and speed of winches, and removal of obstructions from, and enlargement of holds. Continued study is being given to these matters by shipping men and their technical advisers. Suggestions for further improvements put forward by a well-known transportation authority are given below.[2]

HATCHES AND HATCH COVERS

In new ships, economies may be obtained by providing hatches as long as the ship structure permits. In a trade where long lengths of steel or timber are carried, cargo handling is made more economical by cutting back 'tween-deck hatches so that they are longer than the main deck hatch openings. The hatches on the new ships of the Maritime Commission are long and wide, the largest hatch being 50 feet long and 20 feet wide. It is much more economical in cargo handling and in ship's time to handle long steel plates, structural steel, and long timbers, through such a hatch than through a 36- by 18-foot hatch on a vessel of Shipping Board design built 20 years ago.

It is important that a ship be built for doubling up (working two gangs) at large hatches. This is true even when cargo masts are provided on the terminal, because the ships may frequently shift to terminals where cargo masts are not available.

A ship may be equipped with a mast at each end of the hatch, or kingposts (short masts) at each of the four corners of the hatch.

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[2] Stocker, Harry E., Assistant Professor of Transportation, New York University. "Designing Terminal, Ship, and Stevedoring Methods and Equipment for Economical Cargo Handling." A paper read before the annual meeting of The American Society of Mechanical Engineers, New York, December 2, 1940.

Two booms on each mast or kingpost, with an adequate number of winches permit working two gangs in a hatch; three gangs may be worked when the terminal is equipped with cargo masts.

If a five-hatch ship is not equipped to work two gangs on the large hatches, its terminal time is greater than that of the same type of ship so equipped. · In the former cases, the ship works five gangs as a maximum; in the latter, seven gangs, an increase of 40 percent. In addition, when gangs in the smaller holds, served by the smaller hatches, are finished, the inferior vessel can work only one gang on the hatches serving the large holds and consequently departure is delayed.

Provisions for doubling up at the larger hatches is desirable even when a ship is provided with side ports, because many kinds of cargo cannot be worked economically through the ports, and some not at all. The added cost of large hatches to the shipowner is offset many times over in the economies effected during the 20-year life of the ship.

Large hatches, however, accentuate the problem of hatch covers. The larger the hatch, the greater the number of hatch boards and strongbacks which must be handled every time the hatch is opened and closed. Progress has been made in modernizing hatch covers since the first paper in which Stocker participated was presented before the Society of Naval Architects and Marine Engineers in 1930. Steel hatch covers of the pontoon type used on some of the new ships of the Maritime Commission reduce the number of pieces (strongbacks and hatch covers or pontoon sections) to be handled on the weather deck, from about 59 for a 50-foot hatch to about 10. This type of hatch cover seems to be better suited to a trade such as the intercoastal trade than some other types of steel hatch covers, because deck loads of lumber are carried, and often only a part of a hatch is worked because the other half is covered by part of the deck load.

In the 'tween and shelter decks, wooden hatch covers are used in the new ships, but a big improvement is made in some vessels by providing wheels on the strongbacks, or jacks on wheels, so that the strongbacks may be rolled to the end of the hatch. This is a speedier and safer operation than hoisting these heavy pieces of steel with the ship's gear.

BOOMS

When long lengths of steel and lumber are carried, as well as when there is frequent handling of cargo at terminals where there are two or more shipside tracks, it is desirable that the length of a ship's booms be made as great as possible. Long booms add little to the cost of the ship, but the savings in cargo handling during its life greatly exceed the cost, even if the extra length of the booms is useful only a small part of the time.

Analysis of questionnaires supplied by the carriers in the intercoastal trade shows that the maximum length of booms used by any line is 70 feet, on two of the vessels of a line which carries large quantities of lumber and steel. Some ships have booms only 42 to 52 feet long. With such short booms there is a higher cost of handling steel and lumber, as well as of other cargo handled to and from shipside tracks and carfloats, and the terminal time of the ship is increased.

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LAY-OUT OF DECKS

The lay-out of a ship's deck is important, particularly if the ship is to carry lumber or other deck cargo. To permit carrying the largest possible deck load with the minimum of cargo-handling costs, the deck must be kept clear of all obstructions. Rigging, ventilators, vents, and sounding pipes should be placed so as to provide as clear a deck as possible, and winches should be on raised platforms.

BELT AND GRAVITY-ROLLER CONVEYORS

Conveyors have in many instances proved very useful and effective in loading and unloading uniformly packed general cargo, both through hatches and through side ports. It may be said that all conveyor types of transfer have the advantages of direct-line motion, as compared with the arc of a revolving crane boom, and usually provide for more continuous motion than the use of ship's gear. It must not be overlooked, however, in connection with all devices for rapidly loading ships, that the speed of transfer is limited by the ability of the workers in the hold to stow the goods. In discharging, the speed is limited by the ability of those in the hold to break out the cargo and feed it to the conveyors. Furthermore, in discharging, the speed with which cargo can be removed from the conveyor is of importance in determining the speed of the total discharging operation.

The use of conveyors has been found by experience to be particularly adapted to certain established trades in which the average size of packages and other factors favor this method of handling. Thus, in the North Atlantic trade it has been found that approximately three-fifths of the average cargo from the United States to the United Kingdom can be handled from ship to quay shed by conveyors. This method has the advantage of good speed and it also avoids exposure to the weather on the quay, as would be the case if the goods were deposited on the quay by the ship's gear. Sorting is done inside the quay-shed, as time permits, and without delaying the discharge of the ship.

At a United States port, canned goods are loaded through a side port with a portable belt conveyor at a rate 10 percent faster than for an adjoining gang loading the same commodity with the ship's gear.

Conveyors used for loading and discharging ships are of two general types—belt conveyors and gravity-roller conveyors. The first type (fig. 23) has an endless belt that moves continuously in one direction. The belts are made from a number of different materials suitable for the handling of various types of commodities and for different types of operation. There are belts made of steel or wooden slats, and of steel bands, for heavy goods; while belts of canvas, jute, rubber, and cotton duck are employed for lighter articles. Conveyors equipped with slats are used when the conveyor is to work on a fairly steep incline, since the slats prevent packages from sliding back when ship is moving upward, and from sliding down too fast when ship is moving downward.

Gravity-roller conveyors are fitted with a series of rollers, usually made of steel, or sometimes of hardwood. When set on an incline,

packages move down over the rollers by gravity. These conveyors can be set up with curved pieces and other adjuncts, which can be pieced together so as to run in any required direction and provide access to any part of a pier shed. The normal gradient required varies between 2 and 5 percent, according to the weight of the packages being handled.

At some ports, portable belt conveyors are used in conjunction with wooden chutes for effecting rapid loading of such commodities as bagged flour. The conveyor is set up so as to lead from the apron of the pier to a point over the hatch opening. Here, wooden chutes are rigged to lead to different parts of the hold and 'tween decks. At one port (Portland, Oreg.), the flour is brought to the shore end of the conveyor by means of large, 4-wheeled platform trucks towed

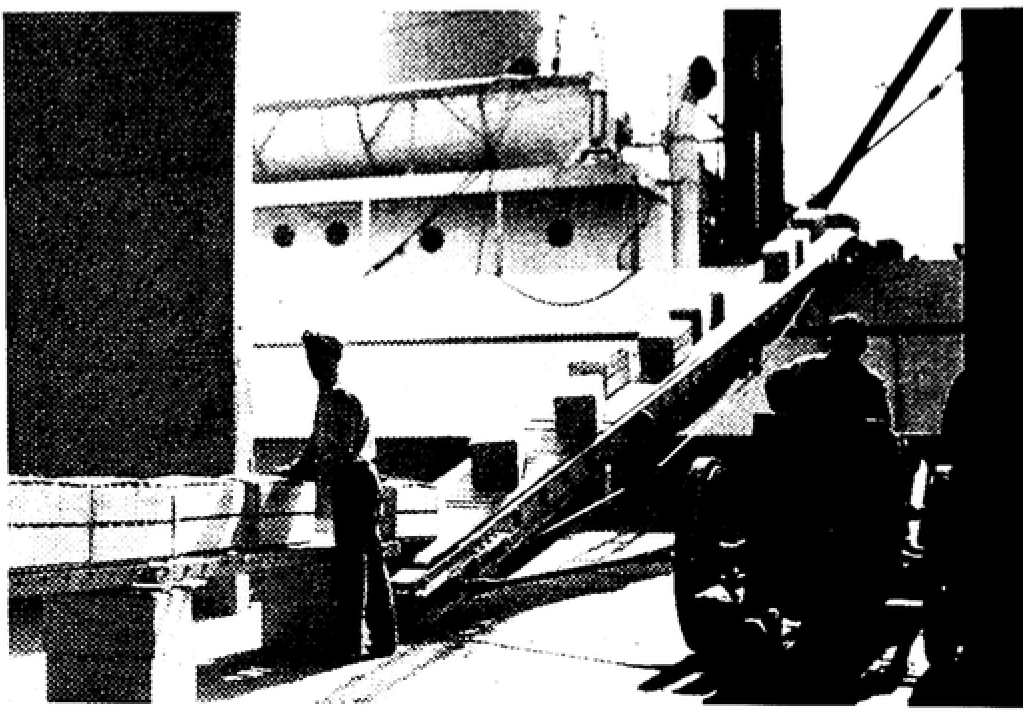

Figure 23.—Loading oranges with portable endless-belt type conveyor, Los Angeles, Calif.

by a gasoline tractor, and is unloaded bag by bag from the trucks to the conveyor, which carries the flour to the hatch opening.

VERTICAL-BELT OR ELEVATOR CONVEYORS

Several types of vertical-belt or elevator conveyors have been developed to carry goods vertically up from or down into a ship's hold. The goods to be handled must be more or less uniform in size and weight for successful operation, and sufficient space is required in the hold to serve the boot or lower end of the conveyor.

This type of equipment is used in the United States chiefly for unloading bananas, and has been installed for this purpose at such ports as New Orleans, Galveston, and Los Angeles. In England, such conveyors have been successfully applied to the handling of frozen mutton, crated and loose bananas, barreled goods, various boxed and bagged materials, cheeses, chests of tea, drain pipes, etc. They can be used both for loading and discharging (fig. 24).

The conveyor mechanism of a vertical-belt conveyor consists of a steel framework carrying a series of rollers and gearing that support and operate two endless chains spaced about 5 feet apart. The chains are connected by metal spreaders, spaced at about 3-foot intervals. To these is attached a canvas belt with sufficient slack between each pair of spreaders to form a pocket large enough to

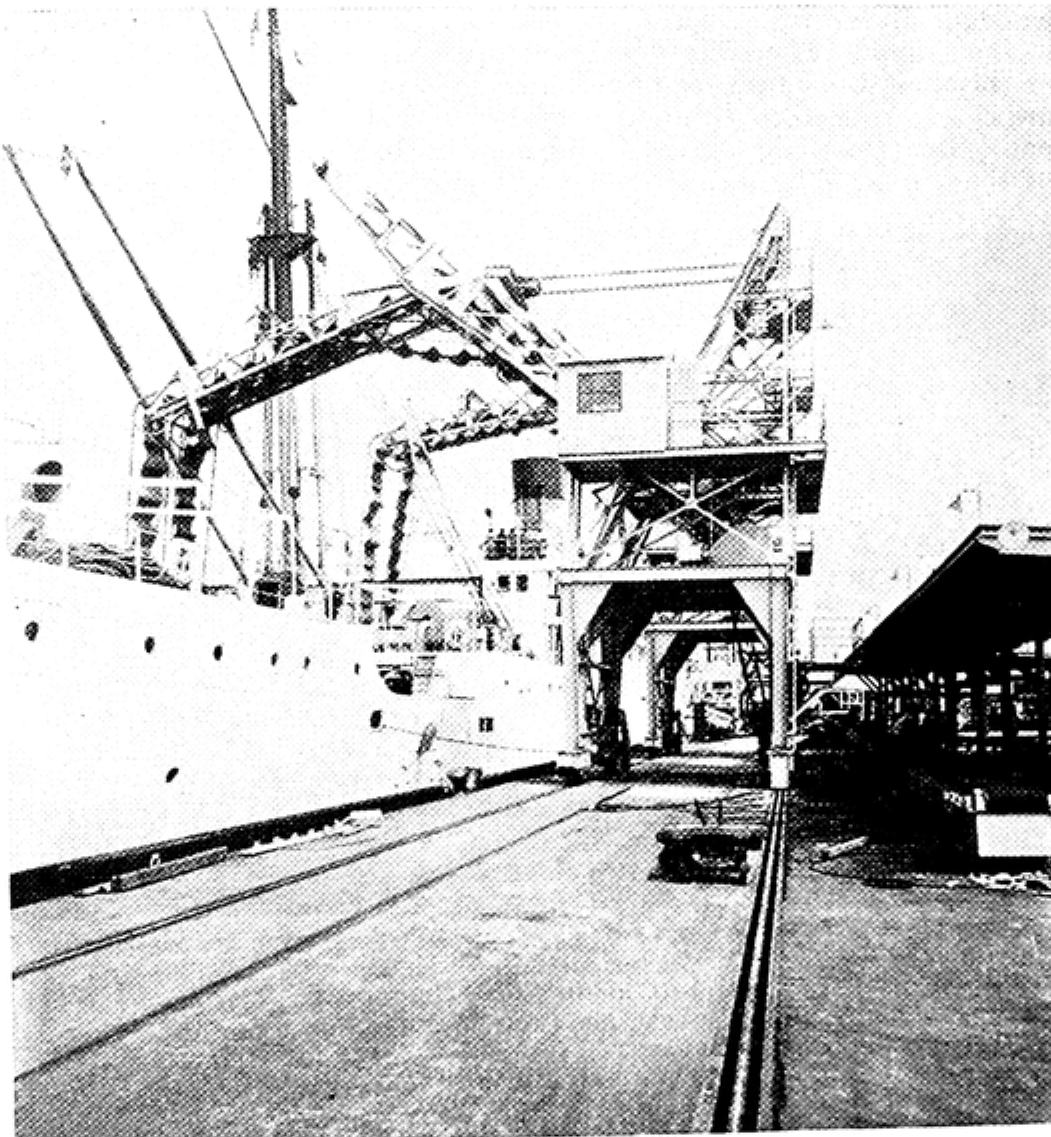

Figure 24.—Vertical-belt or elevator conveyor unloading bananas at Los Angeles.

hold the particular commodity being handled, when the conveyor is set up in a vertical position.

These conveyors are commonly constructed in such a manner that, in unloading, cargo is lifted vertically from the hold, then transferred horizontally to a point over the apron of the pier, and then carried downward to the pier. In other cases, portable vertical-belt conveyors carry the cargo upward to the hatch opening, from where it is transferred to the side of the ship and thence to the apron of the pier by means of a portable endless-belt conveyor, which is so

rigged as to make a complete unit with the vertical conveyor operating in the ship. Frequently, cargo is delivered direct from the elevator conveyor or from the belt conveyor operating in conjunction with the elevator conveyor, direct to horizontal power-driven belt conveyors on the dock, which carry the goods to the storage point selected for them on the dock, or to railroad cars or trucks.

A very efficient installation of elevator and horizontal conveyors is employed at the Tilbury Docks, London, for handling chests of tea, which measure about 2 cubic feet and weigh approximately 120 pounds. Using a gang of 30 to 40 men, distributed between the ship and the transit shed, some 6,000 chests are easily unloaded and stacked in the shed in an 8-hour working day. When the same work was done by means of ship's gear or quay cranes, the number of men required was somewhat less, but the rate of discharge averaged only about 2,500 chests per day.

TELPHERS OR OVERHEAD MONORAIL TROLLEYS

The telpher or overhead monorail trolley consists of an overhead track with electrically operated cars which pick up goods at one part of the pier and deliver them to another part. Such a system may be used either for transferring goods the length of a pier or from inside the shed to the apron, and vice versa. To secure the best results, a telpher should be able to pick up goods at any point and deliver them at any other point on the pier. However, this would require a complicated and expensive trackage, which would prove economical in some large warehouses, but is impracticable for the ordinary pier.

It is chiefly in special warehouses where a large number of standard or uniform packages, such as sugar or cotton, are handled over relatively long distances that the telpher has been used successfully. The initial cost of installation is relatively high, and the system lacks the flexibility that is required on most of the piers handling miscellaneous package freight or general cargo. Systems that have been satisfactory have been installed at the Chalmette plant of the American Sugar Refinery Co. at New Orleans, the Pennsylvania Sugar Refinery at Philadelphia, and the Municipal Cotton Warehouses at New Orleans. Another installation has been made at the Municipal Terminals at Tacoma, Wash.

At the Chalmette plant, the system operates between a wharf measuring about 80 by 800 feet, parallel with the river bank, and a storage warehouse about 250 feet distant from the wharf. The track system is laid out so that there is a loop on the wharf and four loops in the warehouse. The telphers can be operated over any of the loops, as desired. Between the wharf and the warehouse there are four elevated runways along which the telpher machines move.

There are 31 machines in this installation, the usual number used at one time being 20. The machines each have a capacity of seven bags of sugar weighing about 330 pounds each, or approximately 1 long ton. The machines travel 700 feet per minute, which enables them to pick up their load, make a trip to the warehouse, discharge their load, and be back on the wharf in 6 minutes, ready for another load.

The telphers do not pick up the sugar bags at the edge of the wharf. The sugar is unloaded from barges by small electric cranes on the outer face of the wharf, and from ships by the ships' tackle. In both

cases it is first deposited on trucks on the open portion of the wharf as a sling load of seven bags. This load of seven bags is then trucked to a point within the wharf shed from which location it is hoisted by the telphers. The normal capacity of the system is 8,960 bags per 8-hour day, using 20 telpher cars. Each car is capable of making eight round trips an hour, handling 56 bags, or about 9 tons per hour per machine. The 20 machines are capable of handling about 1,500 tons in an 8-hour work day.

At the Municipal Cotton Warehouses at New Orleans, cotton bales are transferred by telpher from the warehouse to the pier shed and direct to shipside. The telpherage system inside the Municipal Terminal at Tacoma likewise carries cargo across the pier to shipside. Another overhead track is installed lengthwise on the pier on the outside. This can pick up cargo to be loaded and move it to the pick-up point beneath the ship's hook, or can take discharged cargo from the apron to a point on the apron near where it is to be stored in the shed.

SHOP CRANES FOR TRANSFER AND PILING

An interesting and successful installation of shop cranes for the interior transfer and piling of cargo is in use on the large passenger and cargo pier, No. 7, at Manila, Philippine Islands. Four longitudinal crane runways carrying 12 shop cranes each are suspended from the roof trusses. The cranes are 2- to 3-ton capacity. The system is operated in conjunction with industrial trucks and is said to have been exceptionally satisfactory.

LOADING AND UNLOADING THROUGH SIDE PORTS

Most of this country's coastwise cargo steamers are loaded and discharged through side ports, and this is also the common method employed on the Great Lakes "package freighters" that carry cargoes of miscellaneous packaged merchandise. Furthermore, there are some oceangoing vessels, particularly of the intermediate passenger and cargo-carrying type, that are fitted with side ports through which a portion of their cargo is commonly loaded and discharged.

Hand trucks, fork trucks, tractors and trailers, lift trucks carrying skids, and portable conveyors are all used for side-port loading and unloading. In handling freight by hand truck, a gangway is laid between the pier and the side port. At some ports there is often a considerable difference in level between the pier and the entrance of the side port, owing to variations in height of piers and side ports, in tide level, and in draft of the vessel, and this difference may become so great that it will be impossible for the longshoremen to push their trucks up the grade.

Partly to overcome this difficulty and partly to lower handling costs, the wharves at some ports have been built with adjustable ramps, and mechanical truck-carrying conveyors have been installed. One commonly used conveyor of this type consists of an endless chain run over sprocket wheels and driven by an electric motor. Lugs protruding from the chain at intervals engage the bar or axle of a hand truck and pull the truck along. This mechanism has been particularly helpful at Boston, New Orleans, and other ports where there is a considerable rise and fall of tide.

Results obtained by the use of such a conveyor at a Boston coastwise pier are summarized by Roy S. MacElwee in his "Ports and Terminal Facilities" (McGraw-Hill Book Co., New York; 1926). The general agent of the steamship company which owned the pier stated that the use of these conveyors "increases the efficiency of their freight handling in and out of the boats fully 40 percent—that during the past year he has handled 334,000 tons of material of all kinds and descriptions on these hoists. Before the hoists were installed it was impossible to unload the freight cars from the car-floats when the tide was low, and this meant a delay of 3 to 4 hours waiting for the tide to reach a point about half-way to high. Even then it was hard work to unload until almost high tide. With the hoists it is possible to unload at all times regardless of tide."

A new device for use in connection with two-wheeled hand trucks, which aids materially in speeding up the handling of cargo to or from a ship by way of side ports, has recently been introduced. This consists of a separate L-shaped metal frame that fits on the regular body of the truck. The frames are loaded with goods on the pier and are then picked up by the truck and carried into the ship. Here they are removed from the truck, which is then immediately free to return to the pier to pick up another loaded frame.

One coastwise steamship line uses this type of hand truck—particularly for goods packed in fiberboard cartons—as follows. Carload freight in cartons is placed on the L-shaped frames and trucked at once from car to shipside. As soon as unloading of the ship is completed, the loaded frames are trucked into the ship. The freight is then stowed by the loaders. After his first trip, each trucker takes a loaded frame into the ship and brings out an empty one. A comparison of the number of packages carried on trucks provided with the detachable frames and the number carried on ordinary hand trucks showed that the former would carry from 2 to 3½ times as many fiberboard cartons as the latter, the number depending upon the type of commodity being trucked. The average for all commodities handled showed that the trucks provided with L-shaped frames carried 2¾ times as many cartons per load as did the ordinary hand trucks.

Fork trucks, lift trucks carrying skids, and tractors and trailers are also commonly used to carry freight through side ports between ship and pier (fig. 25). At some coastwise piers, fork trucks, working in the ship, are operated in conjunction with tractors and trailers. One company uses this system for handling goods that are carried in the ships on loaded pallets. At the port of discharge, a fork truck, working in the ship exclusively, picks up the pallet loads and puts them on trailers. When several trailers are loaded, they are made up into a train and drawn through a side port to the pier by means of a tractor. On the pier, the loaded pallets are removed from the trailers by fork trucks which stack or tier them two or even three pallet loads high.

Conveyors of the endless-belt type are likewise used for transferring freight through side ports (fig. 26). The angle at which the conveyor must be adjusted, due to the side-port entrance being above or below the pier level, is not an important obstacle, since the con-

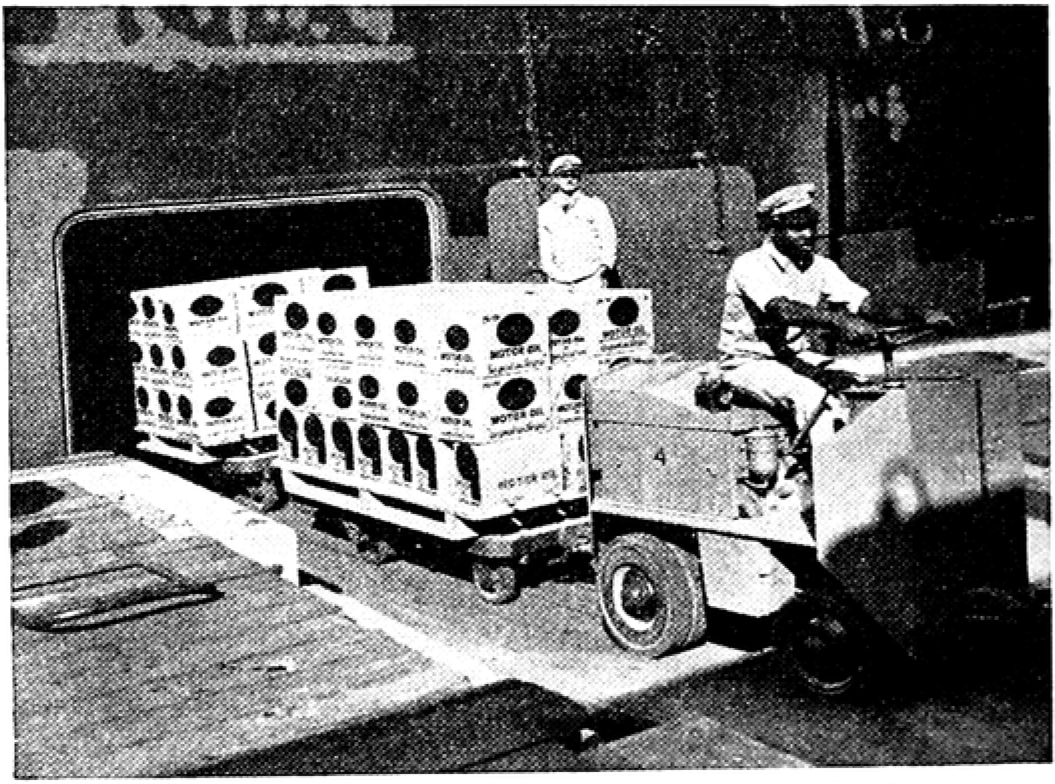

Figure 25.—Tractor and trailers unloading cargo through side port.

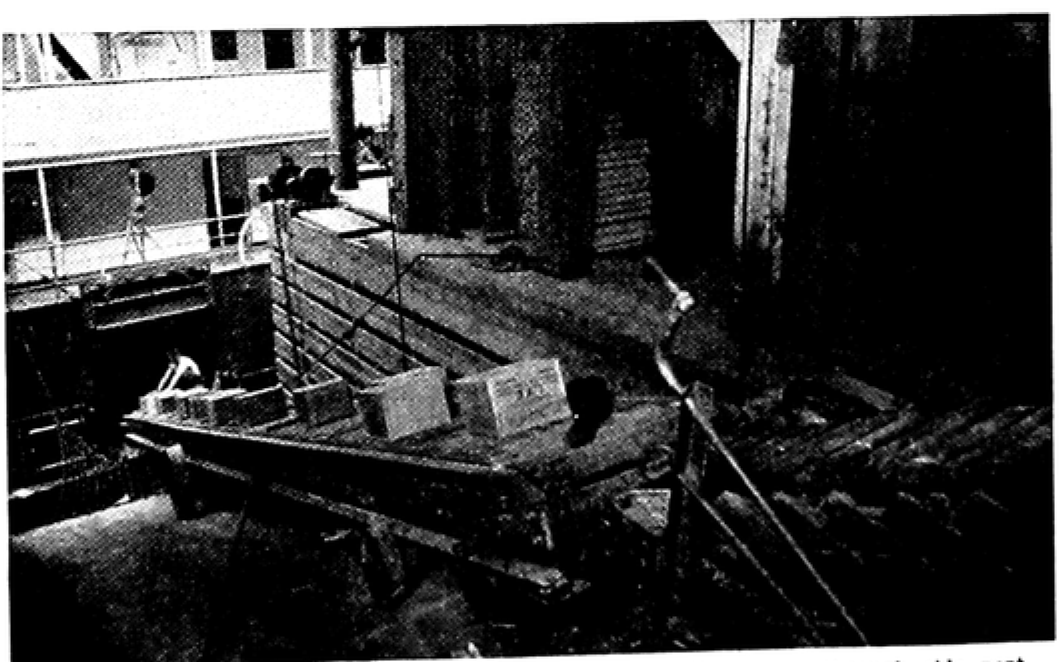

Figure 26.—Endless-belt conveyor being used for unloading cargo through side port.

veyors can be fitted with cleats that make it possible to carry bags, boxes, and barrels at an angle of 30° or more from the horizontal.

Gravity-roller conveyors are frequently used for the transfer of goods from a higher to a slightly lower level, particularly when discharging cargo (fig. 27). In some cases, the gravity-roller conveyors carry the goods direct to one or more endless-belt conveyors on the pier, which distribute the cargo to the storage points selected in advance. In other cases, endless-belt conveyors are used between ship and pier and gravity-roller conveyors carry the cargo past the checkers and sorters, who separate the various lots so they can be loaded onto trailers for transfer to storage points or to railroad cars.

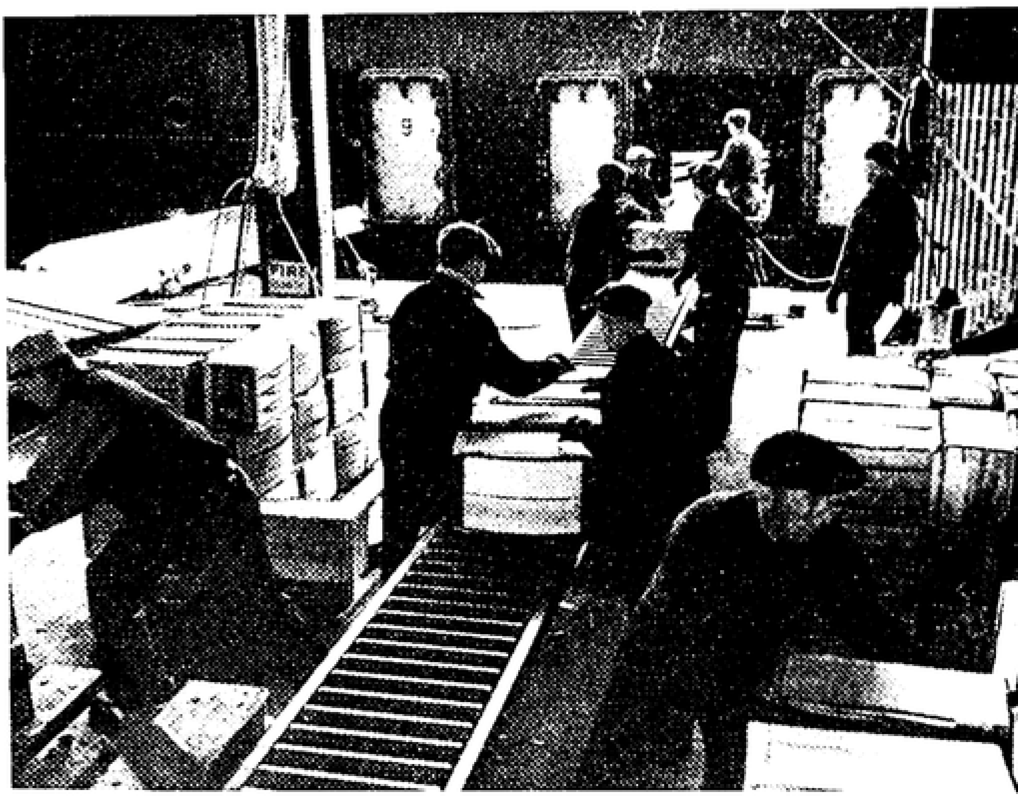

Figure 27.—Unloading Argentine pears through side port with roller-type conveyor.

These examples serve to bring out the point that the different types of equipment may readily be used in combination to meet the particular conditions existing on a certain pier. Special studies of the handling of different types of commodities, the size and weight of packages, and the usual direction of the movement of the goods from ship to pier and thence to railroad car or truck, together with study of the different types of equipment available for transfer, have frequently resulted in greatly improving the economy and efficiency of loading and unloading.

Valuable comment on the use of side ports is contained in a paper prepared by Harry E. Stocker, Assistant Professor of Transportation, New York University, for the annual meeting of The American Society of Mechanical Engineers, at New York, December 1940 (op.

cit.). Excerpts from this paper referring to side ports are here quoted:

Although a ship may have large hatches, served by an adequate number of booms and winches, it is frequently advantageous to have additional facilities for working additional gangs. Executives, captains, and stevedores with whom the writer has talked during the eleven years he has studied the problem, believe that side ports in the 'tween decks are a practical means of obtaining economy in total cargo-handling costs, and reducing port time by providing more facilities for handling cargo from the large holds. The chief advantage of side ports is that they reduce overtime and the terminal time of ships, because there are more cargo openings available for working cargo.

An ordinary cargo ship has five hatches, while a Matson ship operating between Pacific coast ports and the Hawaiian Islands has 5 hatches and 24 side ports, a total of 29 cargo openings.

A ship with deck area sufficient for 5 hatches may work 10 gangs and discharge 400 tons per hour, but with 4 side ports in addition the discharging could be increased to a maximum of 600 tons per hour because the number of cargo-handling openings is increased from 5 to 9. A ship discharged 3,500 tons in 5 hours working both hatches and side ports, with 9 gangs of 20 men each. The tons per man-hour figure 2.16 tons, per gang-hour 43.2, and tons per ship-hour 388.8. Another ship discharged 14,000 tons and loaded 14,000 tons at 5 ports in 88 ship-hours. This rate of operation gives an average of 318 tons per ship-hour. A ship of another line, with 5 hatches only, averaged 161.9 tons per ship-hour with 3 cargoes of sugar.

Another advantage in providing side ports is that working conditions are safer. The most dangerous part of an over-all cargo-handling operation is that of hoisting cargo between ship and shore. With the provision of side ports, the handling of cargo from pier to ship and vice versa becomes the same character of operation as handling on the terminal. Side ports are safer not only for the personnel but also for cargo. Damage occurs on the terminal with narrow aprons because the slingload strikes against the side of the ship. In addition to the damage caused directly, the slingload is often loosened so that, when it is landed, some of the packages fall off and are damaged. Swinging the sling-load into the hold or onto the terminal in order to land it on a particular spot is another cause of damaged cargo. This is avoided when the cargo is handled through side ports. Damage to cargo by rain and snow is reduced because it is easy to rig a canvas covering or tunnel so that at no time is the cargo exposed.

Leaking of submerged ports is an objection offered to the use of side ports. This objection applies principally when ports are submerged after a ship is loaded. Careless maintenance will cause many kinds of damage or accidents, side ports or no side ports.

There are a number of technical points involved in construction of ships with side ports, and in the use of side ports, which cannot be gone into in detail at this time. Size and location of ports and types of doors are important. In addition, the height of the coamings, type of deck, and elevators all have an effect on the profitable use of electric and gasoline trucks through side ports.

A study of one ship provided with side ports disclosed that the ports were not placed as near the center of the cargo space as was practical and that the elevators were not located so as to facilitate the handling of cargo to and from the lower hold. The coamings were found to be too high and the elevator platforms too small and too low. The elevator platforms were not flush with the deck; this caused difficulty in getting trailers on and off the elevators. Elevators should be located away from bulkheads and there should be ample space so as to permit the tractor to circle with a train of trailers.

It is of little value, of course, to provide side ports if the terminal facilities are inadequate for the rapid handling of cargo between the ship and the terminal. This is particularly true when discharging; in a short time, an inadequate terminal will be full of cargo, and the gangs must be "knocked off" until space for additional cargo is provided. Changes may be made, however, in terminal or in cargo-handling methods, to facilitate use of side ports.

In some cases, side-port operations are ineffective because the method of use is inadequate. For example, gravity conveyors are very useful in side-port operations, but their suitability is often nullified by lack of an adequate braking device, to slow the speed of the packages as they reach the lower end of the conveyor. A detachable mechanical brake, or even only a small piece of rope yarn tied to the underframe and allowed to rest on the lower rollers, is very helpful.

The new ships of the Maritime Commission, with six large hatches served by two sets of booms and winches, can work a maximum of ten gangs. Therefore, in these ships, side ports would be of less value than on a five-hatch ship with single gear at all hatches.

LOADING AND UNLOADING BY MEANS OF QUAY CRANES

Wharf or quay cranes are not generally used in United States ports for the loading and discharging of ordinary general cargo. In many European and other ports, on the other hand, the use of quay cranes is the predominant system employed. This is chiefly because the warehouses in these ports, used for the same purpose as pier sheds in the United States, are usually placed at a considerable distance from the quayside and are separated from the quayside by several lines of railway track. Cranes can swing cargo over the space between quayside and warehouse, whereas ship's gear cannot. The use of quay cranes has not been adopted in these ports, as is sometimes supposed, because they are able to handle cargo more rapidly than can ship's gear. In many cases, cranes handle cargo at about the same speed as ship's gear, but frequently they are somewhat slower than ship's gear.

As evidence of the widespread use of quay cranes, the statement of one firm manufacturing this type of equipment may be cited. It advises that it has installed its cranes on docks at London, Plymouth, Falmouth, Liverpool, Southampton, Newhaven, Harwich, Folkestone, Newport, Cardiff, Avonmouth, Rangoon, Calcutta, Mormugao, Auckland, Karachi, Wellington, Sydney, Durban, Port Elizabeth, Vancouver, Singapore, Beira, Haifa, Abadan, Istanbul, Santos, Buenos Aires, Calais, Havre, Gothenburg, Leixoes, and Cadiz (fig. 28).

Some heavy-duty cranes have been installed at various piers in the United States, which are intended chiefly for the handling of heavy packages of goods that move overseas as general cargo, such as heavy machinery. These cannot be compared, however, with the light-duty cranes of 1½- to 3-ton capacity that are so common a feature of many foreign ports and are used particularly to handle all types of small, miscellaneous packages. On the Erie Railroad pier at Weehawken, N. J., one 20-ton and three 10-ton heavy-duty cranes are installed to transfer heavy packages from railroad cars to lighters (fig. 29).

The port of Seattle terminals are equipped with a number of cranes and derricks of various types and capacities, the two types used for cargo work or heavy lifts being locomotive cranes and shear-leg derricks. There are three locomotive cranes, each rated at 35-ton capacity. These are the usual type of steam-powered, rotary, traveling pillar crane mounted on a car bed and moved over standard-gage railroad tracks. They are extremely flexible in operation and, within the limits of their lifting capacity, are the most useful cranes in the port. Their mobility and broad field of utility, ranging from terminal construction and maintenance to the handling of bulk or heavy freight of many kinds, make them especially adapted for a general-cargo port such as Seattle. Their weakness is in the limited lifting capacity (5 to 10 tons) when the boom approaches horizontal position, as it must in a long reach from wharf to the hatch of a ship with a wide beam. Heavy lifts, over 20 tons, are handled by shear-leg derricks, of which the port has three. Among the many uses to which this equipment has been put are lifting boilers and engines out of vessels, loading or unloading locomotives, freight cars, flat cars, passenger coaches, tank

cars, snow plows, mining machinery, large structural steel-bridge members, yachts, and tanks, along with the ordinary routine work of lifting heavy cases of machinery, engines, etc.

Figure 28.—Quay cranes used for handling general cargo at Durban, Union of South Africa.

Other cranes of the type used for handling miscellaneous general cargo in many world ports have been installed on two of the piers of Foreign Trade Zone No. 1 at Stapleton, Staten Island (fig. 30). Each of these piers is equipped with 12 semiportal revolving electrically operated 5-ton gantry cranes with a luffing device, and there are

in addition 5 self-propelled electrically operated combination cranes. The latter handle $2\frac{1}{2}$ tons with revolving units and 1 ton in straight-line operation. These cranes have been found useful for handling cargo from and to ships' holds, to and from railroad cars on tracks

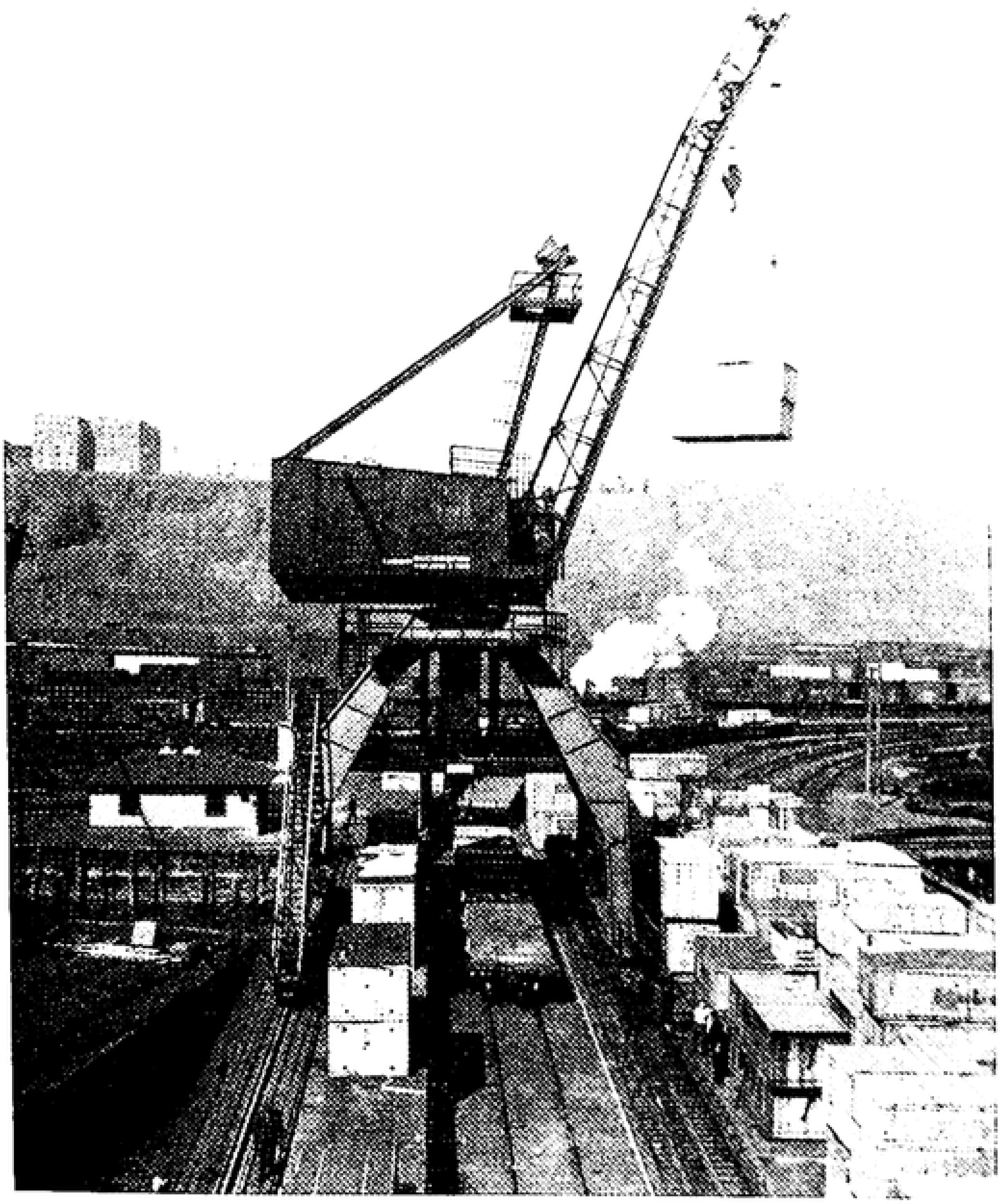

Figure 29.—Heavy-lift crane on railroad pier at Weehawken, N. J.

alongside the pier sheds, to and from lighters, and to and from the upper and lower decks of the pier sheds. It may also be noted that these piers are provided with elevators for transporting goods between the upper and lower decks of the pier sheds, and are equipped with standard cargo beams (cargo masts) and catwalks for the cargo-mast method of handling cargo in and out.

Figure 31 shows one of the cranes at Foreign Trade Zone No. 1 handling Chilean copper brought to the Zone by lighter for transshipment to a European-bound vessel. In this operation the pier cranes lift the drafts of copper from the lighter berthed alongside the pier and place them in trucks which carry approximately six drafts a trip. Each draft weighs approximately 1 ton. The truck then carries its load to the upland where a large caterpillar crane unloads the truck and places the draft on dunnage on the ground, where it remains until the outward steamer is ready to load. Three trucks are used in the operation, one loading, one unloading, and one en route. One pier crane operator is required, also one upland crane operator, one checker, three longshoremen on the lighter, and

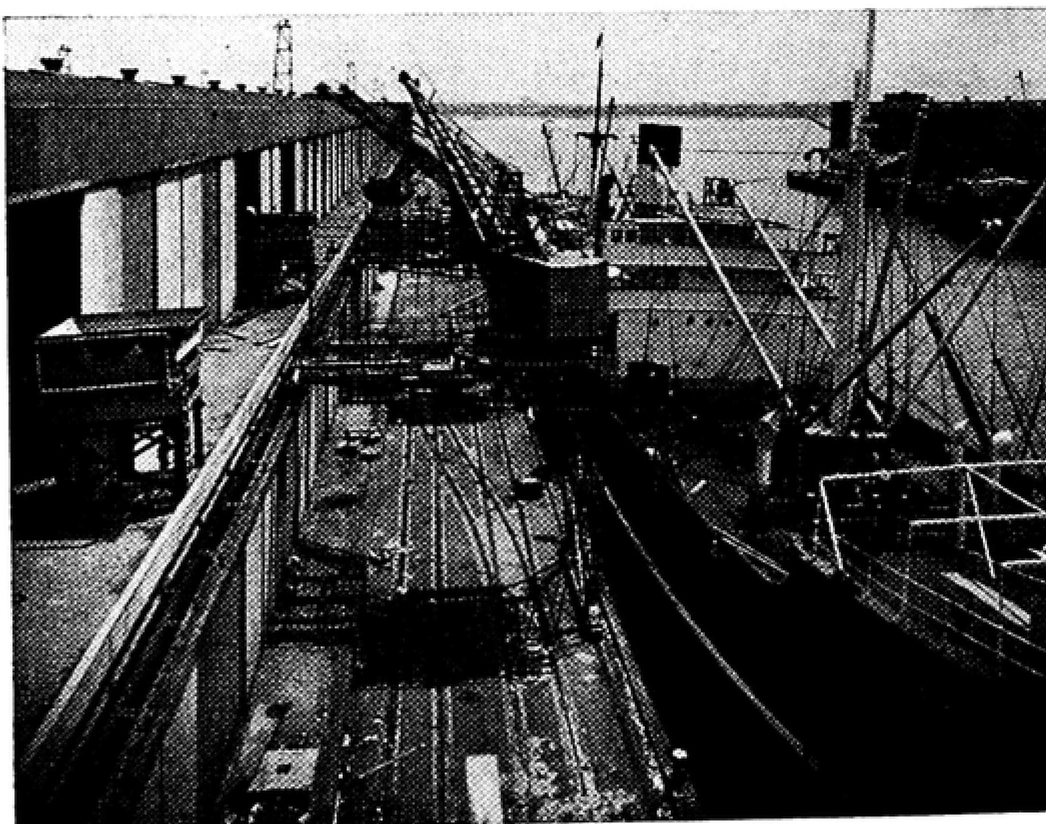

Figure 30.—Cranes used for handling general cargo at Foreign Trade Zone No. 1, Stapleton, Staten Island.

three warehousemen on the upland. In an 8-hour day this crew can load or unload 450 tons minimum of copper or similar metal bars. The cost is said to be low.

The cranes used at European and other foreign ports for handling the ordinary run of miscellaneous general cargo are of different types and are operated by different kinds of power—steam, electricity, and hydraulic. Probably the most common is the half-portal or semi-portal electric crane, to which power is supplied by central power stations. In such a crane, a vertical supporting leg moves on a rail close to the edge of the quay, and a horizontal leg moves along a rail fixed to the face of the transit shed some distance above the ground. On the water end of the horizontal leg is the crane-operating cab and the boom or jib which is usually so constructed as to turn

a complete circle. Full-portal cranes or full-arch gantry cranes are also widely used. This type is supported by a substructure which runs on two parallel tracks close to the edge of the pier.

The method of loading by means of cranes does not differ much from that employed when winches are used. After the hatch has

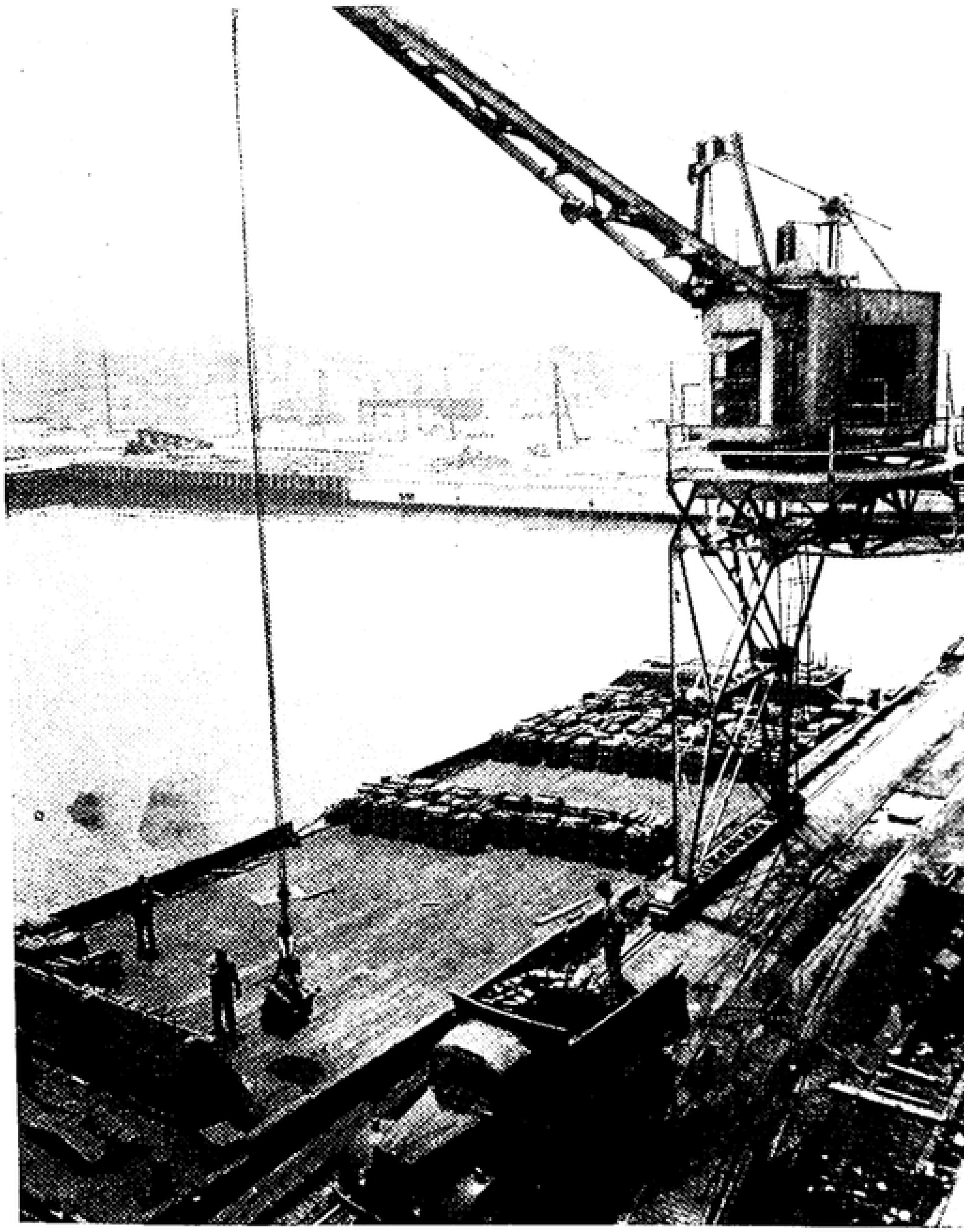

Figure 31.—Handling Chilean copper for transshipment at Foreign Trade Zone No. 1, Stapleton, Staten Island.

been opened and the crane moved opposite to it, the goods are brought within the radius of the crane, either by placing a freight car in position or by trucking the packages onto the open space near the crane. The crane-hook is attached to the draft and the load is lifted above the level of the ship's bulwarks. The crane is then

turned until the boom is over the hatch opening, and the draft is lowered to its destination in the lower hold or the 'tween decks.

One of the principal advantages of a quay crane is its wide range of action, both horizontally and vertically. To some extent, also, cranes are superior in lifting power to ship's gear. This factor is not so pronounced today, however, as it was some years ago, since in many modern ships the booms are capable of lifting loads of at least 2 tons, and it has become common practice to provide special heavy-lift booms that can handle loads of 5 to 10 tons, and even more.

The usefulness of the quay crane is largely demonstrated by its ability to raise cargo from the ship's hold and deposit it over a considerable area of wharf or quay frontage, either on the quay itself, on railroad cars, or on the upper floor of an adjacent transit shed. Furthermore, the jib or boom is usually long enough to enable it to reach over barges or lighters lying between the ship and the quay—a common situation in many European ports.

Two average cranes, unloading from one hatch, can distribute their loads over a length of some 250 feet of quay. This is frequently a factor of great value in achieving rapid discharge of a vessel. Drafts can be deposited at several points, and can be sorted as convenient, without holding up the discharge of the ship—as might well be inevitable if ship's gear, which could deposit drafts only in a small area, were employed.

Modern quay cranes, it should be noted, are constructed so the jib or boom can be moved outward and inward in a straight line, as well as swung around radially or in a circle. Such a crane can work without being blocked by ship's rigging or mast stays and ratlines. Also, three such cranes can work at a single hatch, though it is very seldom that such a concentration is required. The central crane, in such a case, would work in a straight line and the two outer cranes would work radially.

Even in ports that are equipped throughout with cranes for handling general cargo, ships frequently employ their own gear exclusively. According to Cunningham:[3]

> The fact that this equipment (ship's gear) is available and can be used at far less cost than the charges for crane hire, causes it to be put into operation even at ports which are well provided with quayside appliances, sometimes working unaided, but, not infrequently, using the quay cranes as an auxiliary in order to secure greater dispatch.

With further reference to quay cranes, as compared with other methods of handling cargo, Cunningham adds:

> While in New York, the author observed the rate of handling goods by the burtoning system (union or married-fall system), where the quayside cargo hoists (cargo masts) were used in conjunction with the ship's gear. Some individual cycles and short series were speedy, taking about a minute per cycle or less, but, generally speaking, the average rate worked out at about 40 to 50 cycles per hour. This is approximately the same as the performance of an ordinary quay crane, the movements of which are governed by a variety of circumstances. In neither case is there freedom to maintain the full capability of the appliance in regard to speed. On the whole, the evidence appears to show that the action of burtoning, either by ship's derricks or quay cargo masts, is rather speedier than the action of the crane. On the other hand, the crane is generally more powerful, and can often handle drafts twice as heavy as those within the capacity of the winch, when such loads are forthcoming.

[3] Cunningham, Brysson. Cargo Handling at Ports. Chapman & Hall, Ltd., London, 1926.

But it must not be overlooked that many modern steamships are equipped with gear capable of handling loads up to 6 tons, and some, with special gear, loads greatly in excess of this.

Some of the advantages and disadvantages of the use of quay or wharf cranes for handling general cargo may be summarized as follows:

1. Cranes reduce the amount of hand labor required. Fewer deck men are needed, the only worker usually required on deck being a man to signal to the crane operator when to lower away or when to hoist. One man, acting as the crane operator, replaces from two to four winch operators.

2. The point of deposit on the quay or pier is larger when a crane is used, because of the larger radius of the crane. This may help to relieve congestion at the point of deposit, when discharging, because the crane can usually put down a second draft before the first draft is sorted or completely cleared away, and because the longshoremen can work continuously without having a draft "hang" or remain suspended above them while the preceding draft is being removed.

3. Other advantages, of relatively minor importance, are that the rigging of the ship's gear can be dispensed with when shore cranes are used; that shore cranes are usually more powerful than ship's winches; and that the crane is likely to be in better working condition than the winches on some of the older ships.

Disadvantages of the quay crane for handling general cargo:

1. Cranes are expensive to install and they replace in some measure existing equipment (ship's gear), so that their total overhead cost is large. Consequently, they can, as a rule, be advantageously used only where their work is largely continuous, owing to a large volume of freight and many ships alongside day in and day out.

2. Cranes require a large amount of space and cannot be placed on the relatively narrow piers common to many United States ports.

3. The movements involved in loading or discharging with a crane are virtually the same as those involved when ship's gear is used. A marked increase in speed of actual transfer is, therefore, not always possible—particularly in view of the increased efficiency of ships' equipment in recent years.

4. The revolving crane may be wasteful of time, and is sometimes limited in action by the stays or ratlines attached to the ship's masts or by the kingposts ranged along the ship's deck between the hatch openings and the bulwarks.

COMBINATION OF METHODS

It is of course possible to use several methods of cargo-handling in combination and this is frequently done. In many ports it is a not uncommon practice for the ship's gear to lift cargo from the hold to the deck, where it is picked up by quay cranes and deposited on the quay. Generally speaking, the weight of a draft from the ship's hold does not exceed 1,400 to 1,500 pounds, whereas most modern quay cranes are capable of handling loads of 1½ to 3 tons or more. Accordingly, two drafts of cargo are sometimes slung on a beam and handled by the quay cranes in a single lift. Quay cranes also work side by side with ship's winches in lifting cargo from the holds. This combination of cranes and winches is an excellent arrangement for supplementing ship's gear, and enables a highly intensive rate of operation to be maintained.

FLOATING CRANES

Floating cranes are provided in all the major world ports to handle very heavy packages and individual pieces. Except in special instances, it would not pay to install a large and expensive heavy-lift crane at a wharf over which general merchandise normally passes,

for its service would be limited. However, a crane that can transfer heavy lifts between lighters or piers and oceangoing ships lying in any part of a harbor, is of great service. Without such equipment, it would be virtually impossible to ship many articles of considerable importance in international trade, such as extra-heavy pieces of machinery, large pressure vessels used for oil refining and other purposes, and heavy condensers, which are too cumbersome to be handled by the ordinary ship's tackle.

SPECIALIZED EQUIPMENT FOR HANDLING GENERAL CARGO

A considerable quantity of general cargo consists of uniform or uniformly packed goods. This type of cargo is frequently forwarded in full-cargo lots or in large shipments which occupy a large proportion of a ship's capacity. Cargo of this description includes such commodities as case oil, bagged goods including coffee, sugar, flour, and grain, cotton, wood pulp, burlap, and barreled asphalt.

In many ports this class of cargo is handled by means of the ship's gear; but in others, where there is a large and regular movement of one or more kinds of uniformly packed goods, specialized equipment has been introduced to expedite transfer to or from the ship. The principal types of equipment used for this purpose are described below.

SPIRAL CONVEYORS

Spiral conveyors (see fig. 32) have been installed at several ports for loading case oil, which is refined oil in 5-gallon metal containers, packed in uniform outer boxes, two containers per box. The spiral conveyors, specially-built for the purpose, are lowered into the hold of the ship by means of a crane supported by a movable tower that travels on rails laid along the edge of the pier. By means of gravity rollers the individual cases are delivered to the conveyor, down which they spiral by gravity into the hold of the ship. The base of the conveyor is equipped with a ring of gravity rollers and the individual cases, upon leaving the conveyor, are directed along several short lines of gravity rollers directed toward different parts of the hold. The only work performed by the longshoremen consists of removing the cases from the rollers and stowing them in the hold.

Stern [4] reports that with a spiral conveyor installation studied at one United States port, an average of 88.2 cases was handled per man per hour. At two other ports where case oil was transferred by burtoning with a married fall, averages of 78.2 and 73 cases were loaded per man per hour.

Spiral conveyors are also used for the handling of raw sugar at Honolulu, Port Allen, and Hilo, in the Hawaiian Islands. Bags of sugar weighing 105 pounds each are brought over the hatch by belt conveyors from which they are discharged into the conveyor or chute, which is known locally as a "saxophone." At the bottom of the saxophone the bags are discharged onto wooden chutes which carry them close to the point of stowage. At one of the above ports the average amount handled during a 1-year period was 78 tons per gang-

[4] Stern, Boris. Cargo Handling and Longshore Labor Conditions. Bureau of Labor Statistics, United States Department of Labor. Government Printing Office, 1932.

hour, compared with 50 tons when the ship's gear was used for loading.

WOODEN CHUTES

In many cases, loading speed can be materially increased by the use of wooden chutes leading downward to the 'tween decks or hold.

At Tacoma and Seattle large quantities of flour are loaded directly at the flour mills by means of wooden chutes, fed by belt conveyors. A series of flat wooden chutes is set up, which leads directly from

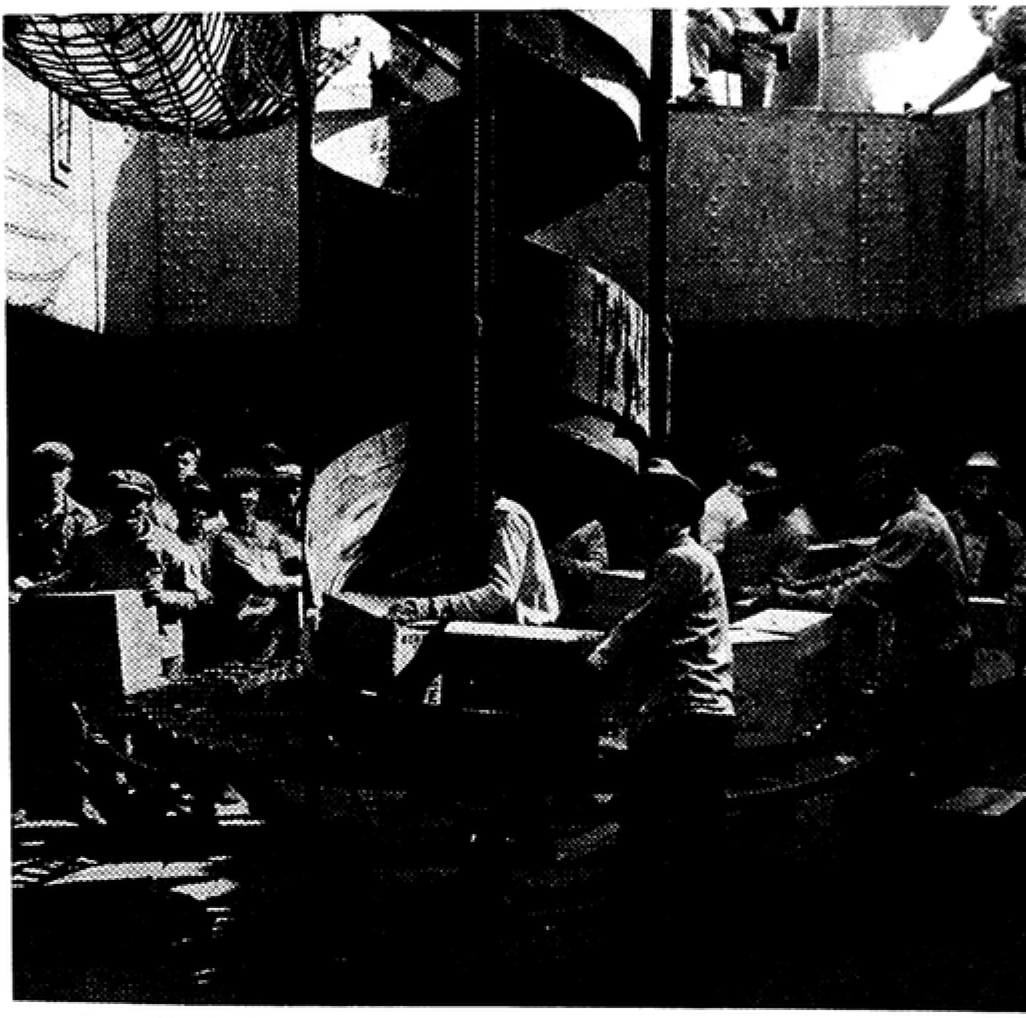

Figure 32.—Loading case oil with spiral conveyor. Base of conveyor inside hold.

the mill to the ship's hatch and thence, by means of additional chutes, to various parts of the lower hold and 'tween decks. The bags of flour are conveyed on belts from their place of storage in the mill, to the top of the system of chutes, and then slide by gravity down the chutes to the hatch opening. Here a special platform is rigged, which slows down the speed of the bags and enables a man working at the platform, known as the "sack turner," to divert the individual bags into the several chutes which lead from the platform into the different sections of the ship's hold. The speed of loading the ship by this means depends almost entirely on the speed with which the men in the hold can stow away the bags.

At another Pacific coast port bagged rice is carried on skids handled by lift trucks that take the cargo into the 'tween decks of a vessel fitted with side ports. The rice is then delivered to the lower hold by means of wooden chutes.

AIR CONVEYORS

As Los Angeles copra from the Far East is unloaded by means of air conveyors of the type shown in figure 33. This type of equipment may be found of value in other ports where a sufficient amount of copra is handled to make its installation a practical matter.

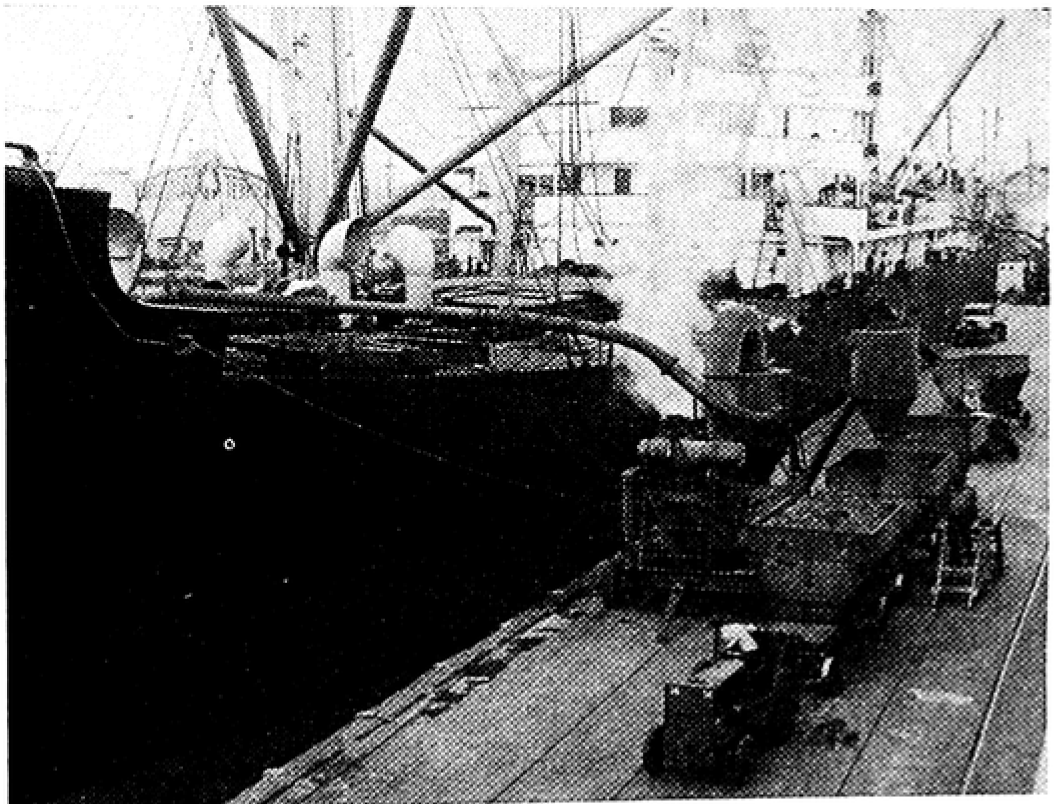

Figure 33.—Unloading copra by air conveyors, Los Angeles, Calif.

RAPID DISCHARGE OF RAW-SUGAR CARGOES

Methods of discharging raw sugar rapidly are described by Stern,[5] and are reprinted here because they may prove practicable for adoption by other concerns handling sugar or other bagged cargo with consequent reduction in costs.

The two outstanding cases of high productivity in discharging raw sugar, measured in terms of either gang-hour or man-hour output, are to be found in refinery No. 1 in San Francisco and in refinery No. 1 in New York. Both refineries have recently introduced new equipment and new methods of transferring the raw sugar from the apron of the pier to the refinery proper, with an increased productivity of longshore labor resulting directly from these changes in the pier equipment.

The refinery in San Francisco discharges Hawaiian sugar only, which comes in bags of 130 to 135 pounds each. The "union" or "married" fall, operated by one winchman, is used to transfer the sling loads from the hold of the ship to a large movable platform erected on the apron of the pier. Each sling

[5] Op. cit., pp. 53–54.

is made up of 16 to 17 bags, thus averaging about 1 long ton per load. Previous to the installation of the new system hand trucks were used to transfer the sugar from the platform on the pier to the scales and thence to the refinery proper or to the warehouse. This method is still used in several refineries in the country. With the old system the average output of a gang consisting of 34 longshoremen was about 1,200 bags or 70 long tons per gang per hour, and about 35 bags or 2 long tons per man per hour.

Under the present system the platform on which the sugar is landed from the ship is placed on the second floor of the pier, which is at about the same level as the deck of the ship, thus enabling the winchmen to see where the sling load is landed and dispensing with the services of a signal man. During the process of unloading, the platform is attached to a portable conveyor equipped with two endless belts, each passing over a scale for the purpose of weighing the bags. The individual bags are shoved by hand from the platform to the two belts and their weights are determined as they pass over the scales. From the conveyor the bags fall down into an opening in the floor leading to an inclosed system of conveyors which carry the bags from the pier either directly into the melting section of the refinery or to the warehouse. This method of discharging the sugar, although exceedingly simple from a technical point of view, seems to prove very effective so far as the productivity of labor is concerned. With a gang consisting of 21 longshoremen, the average output for 1926 was 1,681 bags or 94.7 long tons per gang per hour and 80.1 bags or 4.51 long tons per man per hour, which is the highest average productivity for any one commodity loaded or discharged in bags or other containers. From individual ships a maximum of 2,500 bags of sugar has been discharged per gang per hour, the rate of discharging being limited only by the capacity of the winches and the ability of the men in the hold to make up the sling loads.

The New York refinery has also increased the productivity by a change in the equipment used on the pier which took place very recently. The old hand-truck system, which was similar to the old system used in San Francisco, has now given way to a system of electric platform trucks. Ship's gear is used to transfer the sling loads containing four to five bags of Cuban sugar from the hold to the deck of the ship, and electric cranes, which travel on rails on the roof of the pier shed, lift the sling loads from the deck of the ship and load them on the electric trucks. These carry the sugar first to the scales to be weighed and thence either to the pile or to the melting dump of the refinery. Under the old system, with a gang of 29 longshoremen, the average output for 1923 was 59.2 long tons or 408 Cuban bags per gang per hour and 2.04 long tons or 14.1 Cuban bags per man per hour. With the new equipment and with a gang of 22 men the average output for 1928 was 87.7 long tons or 597 Cuban bags per gang per hour, and 3.99 long tons or 27.1 bags per man per hour, an increase of nearly 100 percent if measured in terms of productivity per man per hour.

CHAPTER III

TYPES OF OCEAN-GOING VESSELS

It has been said that there are nearly as many types of ocean-going vessels as there are trades, and, although this is admittedly an exaggeration, the statement does express a considerable measure of truth. Many ships are more suitable for one trade than for another. Differences in hull construction, cargo-handling and other equipment, ballasting arrangements, and location of engines all have a bearing upon the kinds of cargo a ship is best fitted to carry, upon the trades for which it is best suited, and upon the ease or difficulty with which it may be loaded and the cargo stowed.

METHODS OF CLASSIFICATION

Ocean-going vessels may be classified in a number of ways. They may be grouped according to the type of service for which they are designed and in which they are operated, as, for example: (1) The express passenger and mail service, (2) the intermediate or combination passenger and cargo service, (3) cargo liner service, or (4) tramping service, general or specialized.

Vessels may also be classified according to their method of propulsion, which may be steam reciprocating engines, steam turbines, Diesel motors, or some other type of propulsion. The fuel used, whether coal or oil, is also employed as a method of distinguishing between different ships.

In connection with vessels designed primarily for the carriage of cargo, the type of hull construction is an important factor in classifying a ship. For example, a vessel may be of the shelter-deck type, of the three-island type, of the well-deck type, of the raised quarter-deck type, or of some type which is a modification of one of the above. Other differences, such as the size of hatches, the number of holds, the number of 'tween decks, the type of bilges or bilge ceiling, the number of cargo booms and winches, the ballasting arrangements, etc., all play a part in ultimately classifying a vessel and determining its suitability or nonsuitability for certain trades or certain classes of cargo.

In addition to the four general classes of vessels named above, grouped according to type of service, there are numerous specially designed types of ships. These include such vessels as coastwise passenger and freight steamers, oil tankers, the steam schooners used in the Pacific coast lumber trade, special ore-carrying ships, and vessels specially designed for the carriage of locomotives and other exceptionally heavy types of cargo. Other special types of vessels include self-unloading ships used in the North American and European coastwise and short-sea coal trades; coastwise colliers with the engines placed aft to provide a clear and uninterrupted cargo space or with

engines amidship and with raised quarter decks to prevent trimming by the bow when loaded; refrigerated vessels designed for specific trades such as the Australian and New Zealand chilled-meat trade or the Pacific coast and South African fresh-fruit trades; fast banana carriers; small Baltic traders designed for the coal and timber trade, with extra broad beams to provide stability when a high deck load is carried, and so on. An unusually specialized vessel is one that was recently built by French owners for the carriage of wine in bulk.

CLASSIFICATION OF VESSELS BY TYPE OF HULL CONSTRUCTION

In any discussion of vessels designed for the carriage of freight, such as cargo liners or tramp ships, it is essential to have an understanding of the different more important types of ship construction, as this has a direct bearing upon the kinds of cargo they are best fitted to carry and is related to the problem of stowage. Cargo vessels are commonly classed by shipping men according to their type of hull construction, and their construction also tends to determine the type of service and the kinds of cargo for which they are best fitted.

The principal types of ocean-going cargo-carrying vessels may be classified as follows: (1) The three-island type (a well-deck ship with two wells, one forward and one aft); (2) the flush-deck type (nonshelter deck); (3) the shelter-deck type; (4) the single well-deck type (with one well forward, commonly called a well-deck vessel); and (5) the raised quarter-deck type. These are shown in outline in figure 34.

THREE-ISLAND TYPE VESSELS

Three-island type vessels are in general use both as cargo liners and tramps. The name is derived from the three deck erections—forecastle, bridge, and poop—with which they are fitted. Ships of this type employed as cargo liners usually have one or more 'tween decks in order to facilitate distribution of cargo of different classes and consigned to different ports of discharge. Tramp vessels, on the other hand, are more frequently single-deck vessels, with open holds suitable for the stowage of bulk cargoes of grain, coal, ore, etc.

The forecastle and poop do much to increase the buoyancy of the vessel at the ends. The forecastle, in particular, adds buoyancy where it is most effective when the ship is steaming ahead into oncoming waves, and is of value in preventing or minimizing the effects of head seas coming on board. As is noted later, in the section entitled "Comparison of Three-Island and Shelter-Deck Type Vessels," the former type does not possess as great a deadweight capacity in relation to its gross and net register tonnage as does the shelter-deck type. The suitability of three-island type vessels for particular trades is influenced in some measure by whether they are of the full-scantling, spar-deck, or awning-deck type, all of which are described below.

The three-island type of vessel was developed, step by step, from the earliest steam vessels. These were designed in much the same fashion as the sailing ships of the period, with a flush upper deck, an anchor deck, or low "monkey forecastle" at the bow, and some-

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times a raised quarter-deck at the stern. In course of time it was found necessary to place the machinery openings at a higher level than the upper deck. Casings were built for this purpose and, to

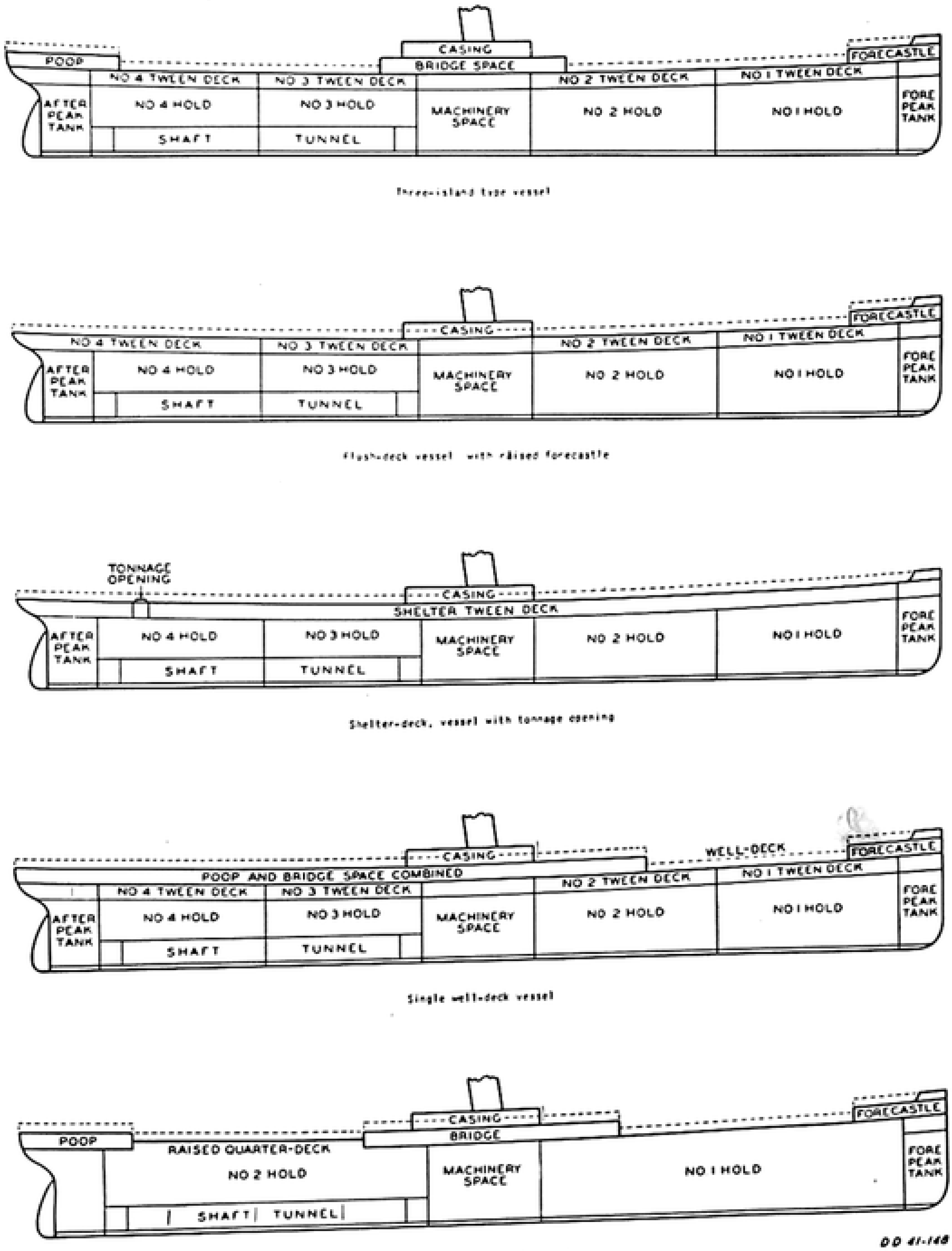

Figure 34.—Types of ocean-going cargo vessels.

protect these, a bridge house or bridge erection enclosed at the ship's sides but usually open at the ends, was built. Then, to increase the carrying capacity and improve the vessel's sea-keeping qualities, the quarter-deck and forecastle were increased in height to form a poop

and topgallant forecastle. Later, when the bridge space was strengthened and enclosed at the ends, the present-day three-island type vessel came into being.

Most frequently the forecastle, bridge, and poop erections on a three-island type vessel cover about 50 percent of the length. In many large and moderately large vessels, however, the midship bridge erection may be lengthened to a very large extent, thus producing the "long-bridge type." This type is favored by many shipowners, since it is suitable for the simultaneous carriage of grain in the lower holds and a moderate quantity of general cargo in the bridge 'tween-deck space.

SHELTER-DECK VESSELS

Shelter-deck vessels, generally speaking, are similar in the strength properties of their upper 'tween-deck construction to awning-deck ships. Holms,[1] surveyor to Lloyd's Register of Shipping, says: "A shelter deck is simply another name for an awning deck." However, the upper 'tween deck or shelter deck is provided with a so-called "tonnage opening," with no permanent means of closing. According to existing national tonnage regulations, the space occupied by the shelter deck is not included in the vessel's registered tonnage, for the reason that it is not a permanently closed-in part of the ship's structure. This is of benefit to the shipowner since it reduces charges for tonnage dues and other expenditures that are based upon the vessel's register tonnage. The necessary tonnage opening takes the form of a small special hatchway, usually at least 4 feet long and having a width equal to at least the width of the after cargo hatchway.

According to Holms (op. cit.):

> The shelter-deck type of vessel originated in the Atlantic cattle trade. In the earlier vessels engaged in this trade the cattle on the upper deck were only partially protected by a rough, temporary, shed-like erection of deals, which was sometimes washed away. Later, greater security and comfort for the cattle were secured by building a light, permanent superstructure, or shelter deck, having breaks at one or two places (over which a temporary deck could be laid), with large gangway doors in the side for the convenient loading of cattle and cargo. Having the great advantage of providing a large cargo space on a small registered tonnage, shelter-deck superstructures are extensively adopted in both cargo and passenger vessels, the latter having usually a 'midship bridge-house (superposed on the shelter-deck) for the accommodation of the passengers.

Shelter-deck cargo vessels, according to the British shipping periodical Fairplay (October 3, 1940), are usually so designed that the stowage is in the region of 60 cubic feet to the ton. Commenting on the stowage capacity of shelter-deck vessels, using as an example the F-type standard ships built on the Northeast coast during the World War, the magazine states:

> The dimensions of this type were 411.5 ft. by 55.16 ft. by 29 ft. to the second and 37 ft. to the upper deck. When the tonnage opening was closed, these ships carried about 10,750 tons on a draft of 28 ft. 6 in., but in their normal condition—that is, with an open shelter deck, to which most of them were in time converted—the deadweight was about 9,500 tons, the corresponding draft being 25 ft. 10 in. The cubic capacity, including all reserve and other bunkers, was 561,000 cubic ft., and the nominal rates of stowage were, therefore, 52 and 59 cubic feet to the ton in the two conditions.

[1] Holms, A. Campbell. Practical Shipbuilding. Longmans, Green & Co., London, 1918.

The difference in cargo-carrying capacity between a shelter-deck and a full-scantling type vessel may be illustrated by comparing the Maritime Commission's C–1A and C–1B type ships. Both have approximately the same over-all dimensions. The former is a shelter-deck type with an allowable draft of 23.5 feet, and the latter a full-scantling type of 27.5-foot draft. The cargo deadweight for the first type is approximately 6,400 tons, and for the second type 7,800 tons. The full-scantling vessel will be put full and down by cargo stowing at approximately 55 to 60 cubic feet to the ton, while the shelter-deck type will be put full and down by cargo stowing at approximately 70 cubic feet to the ton.

The provision of a shelter deck (or shelter 'tween deck) offers improved stowage facilities which help to reduce cargo damage and make it easier to carry different cargoes at the same time. In recent years the desire to reduce cargo damage has led to the adoption in many ships of somewhat shallower holds, with a corresponding increase in the height of the shelter deck. Modern shelter-deck vessels are seldom built with shelter 'tween decks less than 9 feet in height and more usually with 12-foot shelter 'tween decks. Apart from the possibility of reducing cargo damage, the height of the shelter deck is governed by the usual size of the casks, barrels, bales, etc., of cargo which it is probable will be carried in the shelter deck in the trade or trades for which the vessel is intended, the object being to use the available space in such a manner that no space is wasted and the cargo is well protected against damage.

COMPARISON OF THREE-ISLAND AND SHELTER-DECK TYPE VESSELS

The shelter-deck type of vessel has a considerably greater deadweight and cubic capacity in relation to its gross and net registered tonnage than has the three-island type of ship. This is because the shelter deck is not included in the registered tonnage of a shelter-deck vessel, since, because of the tonnage openings, it is not classed as a permanently enclosed part of the ship's structure. A comparison of two types of tramp steamers, the British standard "A" and standard "F" ships, made by the British shipping journal, "Fairplay" (April 18, 1940), explains the difference between the two type of ships. While this comparison is made between vessels designed for the tramp trade, it applies also to many cargo liners, although, in the latter type of vessel the situation is complicated by the fact that speed frequently enters into the picture and when speed and consequently the weight of the engines and length of the machinery space are increased, the deadweight and capacity of the ship are reduced.

The journal "Fairplay," says:

> The standard "A" ships were of the full scantling type with a poop, bridge, and forecastle covering 50 percent of the upper deck, the moulded dimensions being 400 ft. by 52 ft. by 31 ft., while the "F" class were shelter-deckers of nearly the same size, the dimensions in this case being 410 ft. by 55 ft. by 37 ft. to the shelter deck and 29 ft. to the upper deck. The first class of ship carried 8,200 tons deadweight on 25 ft. 8 in., and had a cubic capacity of 440,000 cu. ft., including the reserve coal bunker; the gross tonnage was 5,200 tons.
>
> On the other hand, the shelter-decker, with an open tonnage well, carried 9,500 tons deadweight on a draft of 25 ft. 9 in., the cubic capacity on a corresponding basis being 540,000 cu. ft. and the gross tonnage 5,250 tons. That is to say that the full scantling ship lifted 1.6 tons deadweight and had a capacity of 84 cu. ft. for every ton gross, while in the shelter-decker these figures were in-

creased to 1.8 tons deadweight and 103 cu. ft., an augmentation of 13 per cent in deadweight and 22 percent in capacity, when compared with the former class of ship.

At first sight it is a little difficult to understand why the shelter-decker should show up so favourably on the score of deadweight and capacity, but the matter can be explained fairly simply if we imagine a standard "A" ship having the wells closed in to convert it into a shelter-decker. If this were done, and the scantlings suitably increased, the draft could be increased by about 24 in.; this would raise the deadweight by about 1,000 tons, and the capacity by 80,000 cu. ft., the gross tonnage remaining unchanged, which would make the ratios of deadweight and capacity to gross tonnage almost exactly the same as for the shelter-decker. Needless to say, no one would think of designing a shelter-decker with the resulting dimensions, which would be 400 ft. by 52 ft. by 39 ft. to the shelter deck and 31 ft. to the upper deck and a draft of 27 ft. 3 in., as the ship would obviously be badly proportioned and unstable, but the principle is not affected.

FLUSH-DECK VESSELS, NOT OF THE SHELTER-DECK TYPE

Flush-deck vessels, not of the shelter-deck type, vary chiefly in accordance with the strength of the frames, plating, etc., used in the construction of the upper 'tween decks. The principal types of ships belonging to this class are the "full-scantling" or "three-decked" ship; the "spar-deck" ship, and the "awning-deck" ship. A flush-deck vessel is one without deck erections, that is, erections (such as forecastle, bridge, and poop) which extend to the vessel's sides and involve an upward extension of the shell plating. When erections of this type are built on a flush-deck vessel, it ceases to be flush deck. In a strictly technical sense, the term "flush deck" is applicable only to full scantling vessels without deck erections; but, in the absence of deck erections of the type described, a vessel having a spar, awning, or shelter deck may be described as a flush-deck vessel.

The term "three-decked ship" is misleading, since, more frequently than not, "full-scantling" ships do not have three decks and, in fact, some so-called three-decked ships have but one deck. The name had its origin in the requirement of one of the classification societies, that ships over a certain depth were to be built with three decks or tiers of hold beams unless equivalent strengthening was substituted. In the full-scantling (three-decked) ship, the full strength of the ship's structure (frames, plates, etc.) is maintained up to the uppermost continuous deck. The ship may or may not have erections above that deck.

These ships are generally most suited for the carriage of cargoes of great density, such as ore, coal, and steel rails, since they have great deadweight carrying power, with the minimum internal volume or capacity to suit the density of the cargo. Full-scantling steamers, because of their strength, are permitted to load more deeply than other more lightly constructed vessels, and therefore are of a type most likely to carry heavy deadweight cargoes with the least unoccupied cargo space.

"Spar-deck" ships were introduced as oversea trades became more specialized and it became desirable to employ in each service vessels that were specially adapted for the trade. The original purpose of these ships was to permit the carriage of passengers, the upper 'tween decks being used for this purpose instead of for cargo. As the weight carried was reduced and the vessels were not so deep in the water, a lighter structure was considered permissible. Lloyd's ac-

cordingly modified their rules and allowed a specially light construction for the upper 'tween-deck part of the hull. Subsequently, it became customary to carry cargo in the spar-deck space, and the strength of the upper 'tween-deck structure was somewhat increased.

Owing to variations in the design and strength properties of individual vessels, there is no hard-and-fast line of division between the three classes of ships here under discussion. According to Walton [2]— "What is sometimes called the spar-deck type has no very defined limits, but, speaking generally, it is typical of a ship having two or more complete decks, but of lighter construction on the topsides than a full-scantling ship, and heavier in scantling than one of the awning-deck type." Ships of this type are suitable for the carriage of cargoes of small densities, for which ample internal space is required and the vessel's freeboard need not be the minimum obtainable, as even a full cargo of relatively light-weight goods will not put it deep in the water.

The "awning-deck" or "shade-deck" type of construction was first introduced in ships carrying native passengers from port to port in the Far East. To provide ventilation, large ventilating openings were made in the topside plating. Subsequently, as it was often found desirable to carry cargo in the upper 'tween decks, this part of the ship's structure was enclosed and strengthened. The construction is still lighter, however, than that of a spar-deck vessel.

SINGLE WELL-DECK TYPE VESSELS

Single well-deck type vessels, commonly referred to simply as well-deck vessels, generally have a single well in which is situated the hatchway leading to No. 1 hold. This type of vessel was originated in order to increase in small vessels the capacity of the after hold which, owing to the greater fineness of the after lines and the space occupied by the shaft tunnel, was so much smaller than the fore hold that when both were full of the same type of cargo, such as coal or grain, the vessel trimmed by the bow.

To increase the capacity of the after hold, its depth was increased by raising the upper deck from 3 to 4 feet above its customary level. At the same time the 'midships bridge house was extended forward to project over the after part of the foredeck. The forward extension of the bridge reduced the space between it and the forecastle and formed practically a square pit in the weather deck. From the fact that this space was constantly full of water during heavy weather, it was appropriately termed the "well," and these ships became known as "well-deckers." At one time the well-decker was the most popular type of tramp cargo vessel; but it is now not regarded so favorably. In these ships the front of the bridge-house forms a target for waves breaking over the bow, and with the upper deck in the well frequently inundated, the hatchway of No. 1 hold, in the well, is exposed to undesirable pressure by the seas. In some of the later vessels of this type, these disadvantages were countered by suppressing the well by joining the bridge and forecastle deck. Vessels of this type were called "partial awning deckers."

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[2] Walton, Thomas. Know Your Own Ship. Fifteenth Edition. Charles Griffin & Co., Ltd., London, 1918.

RAISED QUARTER-DECK VESSELS

Raised quarter-deck vessels are, in general, very similar to single well-decked vessels. Usually, however, the bridge-house of a raised quarter-deck ship is not extended forward beyond its customary position. This type was developed originally for the carriage of coal from the northeast coast of England to coastwise and nearby foreign destinations, the quarter deck being raised to keep the vessel from trimming by the bow when fully loaded. It is principally used for small coasting vessels and short-haul colliers, and the engines are placed either aft or amidships.

The modern cargo ship may be distinguished from the vessel built 20 years ago in three main directions, as far as the portion of the hull above water is concerned, according to the British shipping journal, Fairplay (September 12, 1940). The stem is well raked, the tumble home is small or nonexistent, and a cruiser stern is fitted instead of the older type of elliptical stern. The raked stem, in association with a good flare, seems to keep the fore end of the ship dry when it is pitching heavily, and the cruiser stern has a similar effect at the after end. In addition, the fitting of a cruiser stern improves the efficiency of the ship from the propulsive point of view, and the cubic capacity is increased. The absence of tumble home also is useful when bulk cargoes are carried.

CLASSIFICATION OF VESSELS BY TYPE OF SERVICE

Consideration is given below to the major types of vessels at present engaged in the ocean freight services, with particular reference to their suitability for certain classes of cargo and the problems connected with the loading and stowage of cargo.

EXPRESS PASSENGER AND MAIL LINERS

The large, very fast passenger liners obviously are restricted to the few ocean routes on which a large volume of passenger traffic and high-paying freight is available. Most such vessels are employed on the North Atlantic route between the east coast of the United States and European ports; but other vessels that may be classed as express liners are in service on the routes between Europe and the Far East, South Africa, and South America, and between the west coast of the United States and Hawaii, Australia, and the Far East. Most of these latter vessels, however, have somewhat larger cargo capacities than the North Atlantic express liners.

Express liners are designed primarily for the carriage of passengers, mail, express goods, and other high-grade freight, and have a very large fuel consumption and a relatively small cargo space as compared with the average cargo-carrying vessel. For example, the *Normandie*, an express liner, measures 83,423 gross tons and has a speed of 30 knots. The *Normandie's* cargo capacity, however, amounts to but 133,300 cubic feet. With freight stowing at 40 cubic feet per ton, it could carry 3,300 deadweight tons of cargo. The cubic capacity of the *Normandie's* cargo space is equal to that of an average cargo steamer of from 2,000 to 2,500 gross tons, with a deadweight capacity of 2,500 to 3,000 tons.

It is obvious that vessels of the express type, because of their block coefficients, fuel consumption, interior arrangements, and other features, even if altered, would be almost as unfit for freight service as the average freighter for passenger service.

The loading and stowage of cargo on an express liner is frequently made difficult because of the high speed at which the operation has to be carried out and the relatively small size of the hatches and 'tween-deck spaces. The *Queen Mary*, for example, has one cargo hatch, which measures 15 by 26 feet. On the American C–2 type cargo vessels, on the other hand, the smallest hatches measure 20 by 30 feet, and the largest 20 by 50 feet.

COMBINATION PASSENGER AND CARGO LINERS

Combination or intermediate passenger and cargo liners have a relatively larger cargo space than the express liners and, in addition to carrying a considerable number of passengers, also carry cargo of practically every description. The distinction between the combination passenger and cargo liner and the express liner is, in some cases, difficult to establish. Some vessels of the intermediate type have high speed, carry several hundred passengers, and depend to a considerable extent upon passenger traffic. Others carry passengers only incidentally, and some divide their freight and passenger business about equally. Combination liners include vessels of many types, sizes, and speeds, these factors varying in accordance with the particular trade for which the vessel is built.

Most of the material in the present volume dealing with stowage is applicable to the loading and stowage of intermediate passenger and cargo liners. As a rule, the loading and stowage of this class of vessel presents no out-of-the-ordinary problems, other than those inevitably connected with the handling of any type of ship in port. Speed is generally required, since these vessels sail on carefully planned schedules, and speedy loading always requires careful preparations and intelligent placing of cargo on the dock so that, for example, goods are placed alongside the hold in which they are to be stowed (if possible), and lighters are on hand at the proper time. Moreover, since these ships usually call at several foreign ports, great care must be exercised to stow the cargo for each port so that it will be readily accessible when the port is reached and the ship must discharge, and sometimes load other cargo, all at high speed in order to enable it to maintain its schedule.

The old rule which stipulates that when loading for more than one port, only cargo for one port should be loaded at a time into any particular hatch, must be followed if possible, to prevent mixture of cargo for various ports and consequent over-carriage or short-landing. Even distribution of cargo for each port throughout the various cargo compartments is also of great importance, so that the ship will not be delayed at any discharging port by reason of the fact that the bulk of the cargo for that port is in one compartment, and only small quantities of cargo in the other compartments.

The hatches on intermediate liners are usually of ample proportions and the cargo-handling equipment—winches, cargo booms, king posts, etc.—are generally modern in design, suitably located, and highly efficient, since the owners of such vessels in practically every trade

are faced with strenuous competition which necessitates good service to shippers and they also realize that costly delays in port may be occasioned by failure or inefficiency of any part of the cargo-handling equipment.

On some of the newer vessels of this type built by the United States Maritime Commission the winch controls are placed on a platform situated at one end of each hatch, so that the winch operator can look down into the hatchway. This arrangement is a distinct improvement. It permits the winch operator to watch conditions in the hold, frees him from the necessity of depending upon hand signals from the man stationed at the hatchway, and makes for greatly increased safety and efficiency.

CARGO LINERS

Cargo liners are vessels that carry cargo exclusively or, in some cases, have accommodations for a limited number of passengers (perhaps 10 or 12), and operate over definite routes on fixed schedules. The majority of American-flag cargo ships (exclusive of oil tankers) belong to this classification. These vessels are adapted to the carriage of cargoes of miscellaneous kinds of merchandise which usually move in less-than-shipload quantities, and are also suitable for the carriage of the largest and bulkiest kinds of freight. Many such ships are fitted with special heavy-lift cargo booms capable of handling weights up to 35 or 40 tons. Cargo liners, of necessity, have one or more 'tween decks to permit the stowage of different kinds of cargo, to keep separate consignments which might be injurous to other cargo, and to provide for even distribution of cargo destined to different ports of call.

A noticeable tendency in the design of modern cargo liners has been to increase the number of holds, some vessels having five, some six, and some seven holds. Increasing the number of holds in many instances makes for more rapid cargo-handling and for a shorter stay in port. So far as stowing or breaking out cargo is concerned, the "bottleneck" is the hatch for each hold. If the average rate of loading and stowing general cargo is 20 tons per hatch per hour, a five-hold ship (under ideal conditions) could be loaded at the rate of 100 tons per hour. A seven-hold ship, however, could be loaded at the rate of 140 tons per hour. A larger number of holds also simplifies to some extent the problem of stowing cargo for different ports so it can readily be located and broken out upon arrival at the port of discharge.

Cargo liners are of the three-island type, the flush-deck full-scantling type, the shelter-deck type, and of other types that are modifications of these classes of construction. Generally speaking, however, it may be said that at the present time the most popular structural type for ocean-going cargo liners is the three-deck shelter-deck type. There are several reasons for this: (1) Large cubic capacity is available when required. (2) Should a greater deadweight capacity be needed, this type of ship can provide very appreciable additional lifting power by simply closing up the tonnage opening or openings and stowing cargo in the shelter deck. On an 8,000- or 9,000-ton ship, such additional lifting power would usually amount to from 1,200 to 1,500 tons. (3) With three decks, miscellaneous cargo for several ports can readily be stowed without expense for separation and in such a manner that

it can be located and discharged without undue delay at the port of discharge.

Good examples of modern, carefully designed three-deck shelter-deck vessels are afforded by the C–2-type ships that have been constructed in accordance with designs prepared by the United States Maritime Commission (see fig. 35). These ships incorporate the most modern principles of cargo-vessel construction and are designed for cargo-

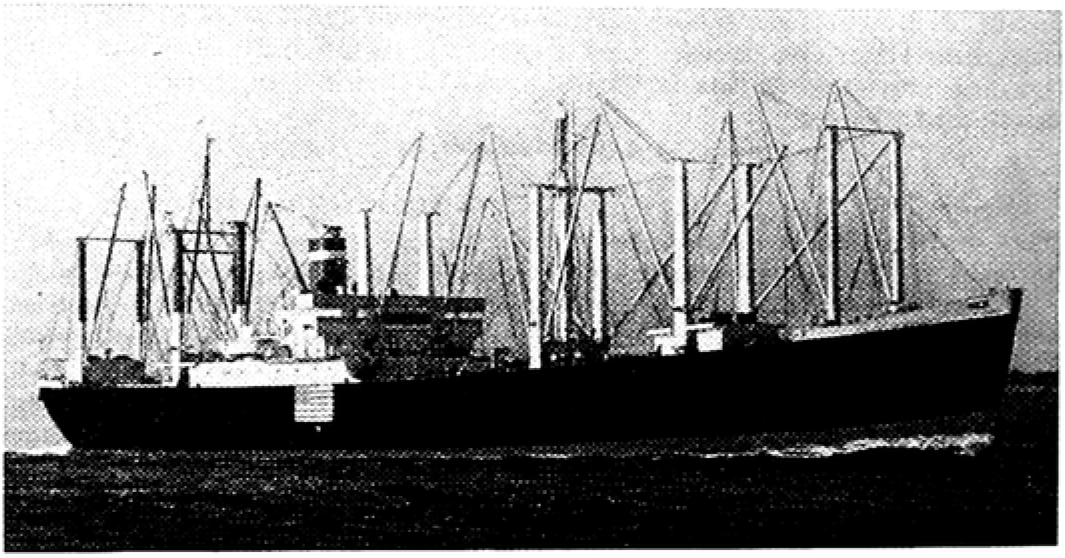

Figure 35.—Cargo liner of the Maritime Commission's C–2 type. Note cargo-handling facilities which permit all hatches to be double-ganged for working both sides of the ship simultaneously.

liner service. Their principal dimensions and other characteristics are as follows:

C–2 TYPE VESSELS

Diesel Propelled

Gross tonnage, 6,200.
Net tonnage, 3,653.
Deadweight, 8,682 tons.
Length overall, 459 feet.
Breadth, 63 feet.
Depth, molded, 40 feet 6 inches.
Displacement at load draft, 13,876 tons.
Bale cubic capacity, 498,983 cubic feet.
Cargo capacity, 7,130 tons.
Number of holds, 5.
Refrigerated cargo, 25,220 cubic feet.
Draft, loaded, 25 feet 9 inches.
Passengers, 12.
Shaft horsepower, 6,000.
Normal sea speed (average sea conditions), 15½ knots.
Cruising radius, 12,500 miles.

Steam Turbine Propelled

Gross tonnage, 6,085.
Net tonnage, 3,573.
Deadweight, 9,758 tons.
Length overall, 459 feet.
Breadth, 63 feet.
Depth, molded, 40 feet 6 inches.
Displacement at load draft, 13,893 tons.
Bale cubic capacity, 562,849 cubic feet.
Cargo capacity, 8,040 tons.
Number of holds, 5.
Draft, loaded, 25 feet 9 inches.
Passengers, none.
Shaft horsepower, 6,000
Normal sea speed (average sea conditions), 15½ knots.
Cruising radius, 13,000 miles.
Deep tank cargo oil capacity, 2,878 tons.

There are five cargo holds, three forward of the machinery space, and two aft. It is to be noted that this arrangement eliminates the small No. 3 hatch and hold that, in many older five-hold vessels, was

commonly situated just aft of the bridge, between the bridge and the 'midships housing. This position necessitated a small hatch and a small hold, factors which, combined with the heat emanating from the machinery spaces, made it impossible to use the hold for the stowage of many classes of commodities.

The vessels are subdivided by seven watertight bulkheads, the forward and aft collision, or peak bulkheads, being carried watertight to the shelter deck, and the remainder carried watertight to the second deck, which is the freeboard deck. This arrangement of bulkheads provides a standard of subdivision of such a nature that any one compartment may be opened to the sea without the probability of the loss of the vessel.

In the Diesel-driven vessels the fuel consumption, based on the use of 5,600 S. H. P., is estimated at 172 barrels per day. In the steam-turbine-driven vessels the fuel consumption, based on the use of 5,600 S. H. P., is estimated at 239 barrels per day.

Based on the total bale cubic and cargo deadweight, there will be available about 73 bale cubic feet of space for each ton of cargo carried in the Diesel-driven ships, and about 71 bale cubic feet in the steam turbine vessels.

Booms for overhead loading at each hatch are designed to handle safely loads up to 5 tons, and are tested to 20 percent in excess of this. The length of all booms is such that when topped to an angle of 45 degrees, they will have an outreach over the side of the ship of 18 feet. All hatches are double-ganged. A 30-ton boom is provided to serve No. 3 hatch. The winches serving all the booms are electric. Cargo winch power and speeds are considerably greater than in the old Shipping Board vessels built during the World War.

The hatches are large and have the following dimensions, number of booms, and number of winches:

Hold	*Size of hatches*	*Number of booms*	*Number of winches*
No. 1	29 feet 3 inches by 20 feet	4	4
No. 2	30 by 20 feet	4	4
No. 3	50 by 20 feet	5	4
No. 4	30 by 20 feet	4	
No. 5	30 by 20 feet	4	4

A complete smoke-detecting system is installed in all holds, with a visual indicating panel in the wheelhouse where it may be seen by the officer on watch. In conjunction with the detecting system, a carbon dioxide extinguishing system is provided to aid in controlling fires which may break out in any hold.

A forced system of ventilation is installed to all holds, which can be operated at all times, despite weather conditions. This furnishes a complete change of air at frequent intervals, thus providing protection against damage due to insufficient ventilation for the majority of the various types of cargo carried. It is expected that this feature will do much to eliminate claims for damage that have heretofore been occasioned by lack of adequate ventilation.

In developing the designs for the C-2 type vessels the Maritime Commission distributed preliminary plans and specifications among shipbuilders and ship operators, naval architects, and others for their comments, criticisms, and suggestions for improvement. As a result, the Commission received a number of careful and thorough analyses of the design including a joint report from a committee

appointed by the New York Maritime Exchange which was composed of representatives of most of the American steamship lines operating cargo vessels.

Comparing the preliminary and final design for the C–2 type ship, Rear Admiral Emory S. Land, Chairman of the Maritime Commission, made the following observations concerning the facilities and equipment which have a bearing on the loading and stowage of cargo:

> The length of holds and number of holds have been changed to conform to recommendations of operators. The revised design has been provided with five cargo holds in place of six, and one hold has been made 82 feet long. It has been possible to do this and retain the ship compartment subdivision by moving the engine compartment about 50 feet aft so that the large compartment is under the highest point of the flooding curve. Deep tanks that can take either dry cargo, various types of oil, or ballast water have been provided in the 2 and 4 holds so that the proper trim can be maintained with engines now located aft of the longitudinal center of buoyancy.
>
> The length of booms has been increased so that with the booms topped to 45 degrees they can load on two tracks abreast the normal pier. It is impractical to lengthen the booms beyond this as it makes them unwieldy and unnecessarily heavy. Larger booms would require higher kingposts to get proper angle of topping lift. The present height of kingposts allows a 2-foot clearance underneath the Manchester Canal bridge with a ship in 23-foot draft.

In the design and construction of the new ships the Maritime Commission has taken advantage of every improvement adaptable to a large-scale mass production project. The new ships are faster than their predecessors and can therefore complete more voyages and earn more revenue in a given time. They are more efficient, both with respect to fuel consumption and cargo-handling. Improvements in connection with the latter include larger hatches, a greater number of cargo-booms, and increased speed and power of winches—all items that make it possible for the new vessels to handle cargo more rapidly. The new ships are more thoroughly protected against fire, the holds being provided with mechanical ventilation to prevent cargo catching fire from spontaneous combustion. The air intakes and outlets for the ventilating system are screened to prevent sparks or lighted cigarettes from being thrown into the hold spaces.

Other modern, well-designed American cargo liners are the four new vessels completed in 1940 for the American Export Lines. Special interest is attached to the cargo-stowage facilities on these ships, owing to the fact that they were specially laid out with reference to the traffic in and out of the Mediterranean and Black Sea ports. In this service the outward cargo consists largely of machinery, manufactured goods, and bulk grain, whereas the flow in the other direction is usually raw materials, including a good deal of tobacco, vegetable oils, and ore.

With this service in mind, the deep tanks were arranged to serve a double purpose. On the outward voyage they are filled with fuel oil, permitting the ships to fuel up in this country for the entire round trip. When the deep tanks containing fuel for the outward voyage are empty, they can then be made available, after a thorough cleaning, to carry bulk sulfur, olive oil, cottonseed oil, or other vegetable oils. These ships have seven holds, an arrangement which facilitates the rapid handling and discharge of cargo.

THE INTERCOASTAL CARGO LINER

Most of the ships engaged regularly in the intercoastal trade between United States Atlantic and Pacific coast ports are cargo liners, since they operate on regular schedules between specific-named ports. The special requirements of this trade have resulted in the building of a number of specially designed vessels that have several interesting features.

Many of these ships have proportionately more holds and hatches than the average foreign-going ships of the same size and tonnage. This is chiefly because intercoastal vessels usually call at a greater number of loading and discharging ports than do foreign trade vessels, some intercoastal vessels loading cargo at 4 or 5 Atlantic coast ports and discharging at 8 or 10 Pacific coast ports, and vice versa. Arrangements must consequently be made so that cargo for each discharging port can be kept separate and readily accessible at the proper time, and this means a greater than usual subdivision of the vessel's cargo space. In some cases the hatches of intercoastal ships are larger and better suited for the transfer of bulky cargo than are those on the average foreign-going cargo liner. Although large hatches are generally an advantage on any type of cargo vessel, they are particularly needed in the intercoastal trade because of the large quantities of lumber and iron and steel products which normally form an important proportion of their cargoes.

Careful attention has been given to providing ample cargo-handling facilities on the ships specially designed for the intercoastal trade, and such vessels have an abundance of king posts so that cargo from each hatch can be worked over both sides of the ship at the same time. Furthermore, on many of the specially designed intercoastal ships, the winches are more powerful and work at higher speeds than those found on the majority of comparable foreign-trading vessels.

Another interesting feature of many of the intercoastal liners is that the winches are arranged in pairs, so that one man can easily operate the two winches usually required in loading or discharging with the ship's gear. The winches are also placed sufficiently close to the opening of the hatch to enable the operator to see what is going on in the 'tween decks or lower hold. Thus, he can, at the proper time, lower away when loading or heave up when discharging, without having to follow blindly the hand signals of the hatch tender standing at the opening of the hatch. It is obvious that winches of this type, and arranged in the manner described, are not only more efficient in handling cargo, but also require less labor to operate than is needed for the average winch arrangement found on the majority of foreign-going vessels.

Some of these ships under favorable conditions have achieved exceptionally rapid loading and unloading speeds. Thus, one ship loading general cargo into 8 hatches with 12 gangs of men and 12 king posts in operation is reported to have loaded 450 tons per hour. This is a little over 56 tons per hatch per hour. Good average speed for the usual ocean-going vessel is considered to be about 20 to 25 tons per hatch per hour. This exceptional speed was probably achieved by employing the operation sometimes known as "swinging the 'tween decks." In this operation, a draft is lowered into the lower hold and

while the goods are being removed from the sling, another draft is lowered through the hatch opening and swung over into the 'tween decks. Thus, lower hold and 'tween decks are loaded simultaneously, this being possible owing to there being a sufficient number of king posts to provide the requisite number of cargo booms.

THE SEATRAIN TYPE OF CARGO CARRIER

Mention of the seatrain type of ocean cargo carrier is included in the section on cargo liners, for the reason that these vessels sail on schedule between specific ports. The first seatrain ship was put into operation between New Orleans and Habana, Cuba, in 1929. Since that time, other vessels of this type have been constructed and placed in service between New Orleans and Habana, New York and Habana, Texas City and Habana, and Texas City and New York.

The seatrain vessels are oceangoing steamers, ranging from 450 to 478 feet in length, and have four decks, on each of which standard-

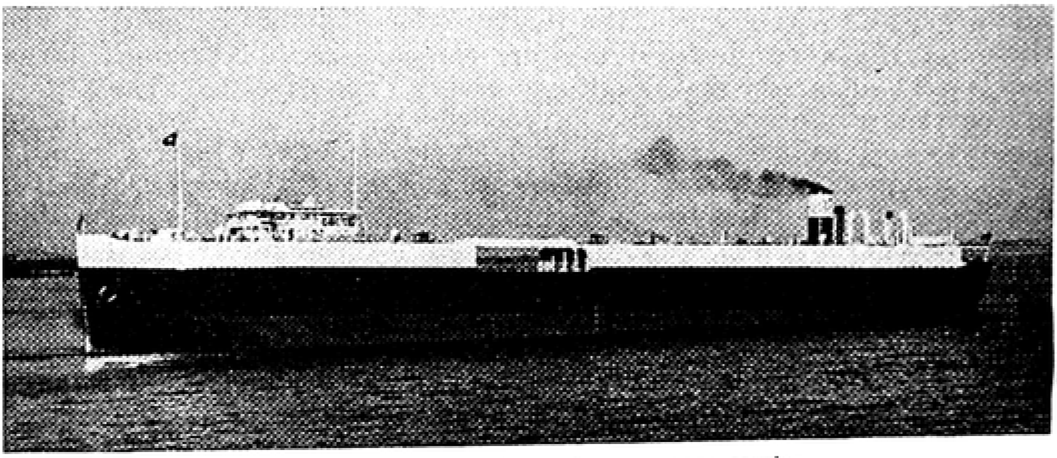

Figure 36.—Seatrain type of ocean-cargo carrier.

gage railway tracks are laid (see fig. 36). Each vessel is capable of carrying 100 loaded freight cars. The ships are loaded and discharged by means of special crane-elevator equipment which conveys freight cars into and out of the holds of the vessels.

From a vessel-operating standpoint, the seatrains are efficient in that they reduce the time spent in port loading and discharging, and reduce general terminal expenses by eliminating all man-handling of cargo through the substitution of simple machinery to move a relatively small number of large units—the freight cars. Because of faster port dispatch, seatrains are able to spend a greater proportion of their time actually carrying revenue cargo than can other oceangoing ships.

From the shipper's standpoint, the seatrains have been of value in that they have helped to decrease or in some cases eliminate packing costs and have had an excellent record in delivering shipments in good condition. This is partly owing to the fact that a large share of the tonnage handled by the seatrains are bulk commodities that are not particularly likely to be damaged during transportation. These commodities include coke, coal, manganese ore, rock asphalt, scrap iron, and the like, which are transported in gondola cars; lard,

cottonseed oil, vegetable greases, acids, gasoline, kerosene, lubricating oils and greases, and molasses, which are carried in tank cars; grain and salt, which are loaded in bulk in box cars; and lumber, poles, timber, and the like, which are transported on flat cars. The seatrains, however, also carry machinery unpacked, in box cars, and fresh fruits and vegetables in refrigerator cars. The latter are carried without change in temperature throughout their entire export journey and without the handling which is often destructive to green goods.

The method of loading the seatrain vessels at Hoboken—a typical installation—is very efficient, rapid, and economical. A specially designed 125-ton crane, with a horizontal extension that projects out over the vessel, is installed on the dock. Under the crane runs a double track from the classification yards and exactly beneath the crane the tracks are broken and big platforms are fitted in these breaks. The platforms in effect are movable bridges and are fitted with rails so arranged that, when in place, they register exactly with the rails on the dock or in the vessel. A car to be loaded into the vessel is first spotted on the platform by a switch engine, locked securely in place, and then the entire cradle bearing the car is lifted from its four corners and moved over the hatch of the ship. The crane then lowers and the cradle or platform descends into one of four sets of guides forming shaftways which hold it in position exactly in the manner of a platform in an elevator shaft. When the desired deck is reached, the cradle comes to rest upon mechanically operated supports, wheel clamps are removed and the car is free to be moved either forward or aft on the rails laid on the decks of the vessel. Cars are moved along the rails within the vessel by means of a steam-driven car-hauling gear.

When each deck has been loaded to capacity, the hatchway itself is utilized. The capacity of typical seatrain ships is 100 cars distributed as follows: 26 in the hold, 26 on the 'tween decks, 30 on the main deck, and 18 on the superstructure. Each car, when placed in position on the vessel is securely anchored by means of four rail clamps to prevent rolling on the tracks. Powerful jacks, operating at an angle of 45° with the vertical, relieve the car springs of the weight of the car. Four stout chains and turnbuckles from the frame of the car draw it firmly down upon the jacks.

SELF-UNLOADING SHIPS

A number of vessels have been equipped in recent years with self-unloading equipment, some for the carriage of bulk sand, gravel, crushed stone, cement, and coal on the Great Lakes, and others for the coastwise service in which the principal commodity transported is coal. The use of this equipment is of particular value in decreasing the turnaround time in ports which lack adequate discharging facilities. These vessels also provide an effective method of handling sluggish and non-free-flowing materials, such as wet coal or wet sand.

Classified according to the manner of handling cargo, self-unloading vessels may be placed in one of four groups: (1) Endless-belt conveyor system; (2) scraper conveyor system; (3) electric ship crane system; or (4) gantry crane system.

The endless-belt conveyor system and the scraper conveyor system may employ a single discharge or a double discharge with a central feed. Either system may use a conveyor boom or a cantilever conveyor in the discharging of cargo. When the electric ship crane system is adopted, a number of cranes are mounted on the deck of the ship. Hooks, magnets, and grabs are used in the handling of cargo under this system. In the case of the gantry-crane system, the gantry is run the full length of the deck over the cargo space. The grabs of the cranes carry the cargo to the center of the gantry where it is loaded onto an endless-belt conveyor which discharges the cargo to the shore.

The majority of the self-loading ships use the endless-belt conveyor system and the scrape conveyor system. Of these two the scraper conveyor system seems to be preferred.

Vessels using the endless-belt conveyor system and the scraper conveyor system have holds with transverse hoppers sloping down to hinged doors, namely, gravity pockets. As these pockets are opened, the cargo being carried by the ship is discharged into longitudinal tunnels. If the endless-belt conveyor system is employed the cargo falls onto the belt which carries it to a inclined conveyor, which in turn delivers the cargo to a boom conveyor for discharge on shore. If the scraper-conveyor system is used, the cargo is discharged into the tunnel and is then scraped with a large scoop operated by a cable system which drags the scoop with the cargo to an inclined conveyor.

The unloading speed of the different self-unloading systems varies. For example, one vessel which is equipped with eight scrapers and a 180-foot boom conveyor is able to discharge bulk cargo at the rate of 1,000 tons per hour.

TRAMP VESSELS

Tramp vessels are commonly of the three-island, shelter-deck, or well-deck type. The ordinary cargo tramp is designed for usual and reasonable conditions, that is, it is expected to carry a cargo which stows at the rate of about 50 to 60 cubic feet to the ton. A number of tramps have been constructed with special features to make them particularly suited for the carriage of grain, ore, or coal—the three most important ocean-borne bulk cargoes—but the average oceangoing tramp is built along fairly standardized lines which experience has shown will make it suitable for the carriage of any of the bulk cargoes usually transported by this class of vessel.

The trading of the average tramp steamer is world-wide in extent. For example, a tramp may be chartered to load a cargo of wheat in the River Plate for one or more ports in the United Kingdom, for North Sea continental ports, for Scandinavia, or for the eastern or western Mediterranean. The ultimate port of discharge, which is often decided while the vessel is on its passage, will naturally have an important bearing on the owner's decision about subsequent employment. If the vessel were ordered to discharge at, say, Antwerp, the probability is that loading coal outward from the United Kingdom would be the next employment. If, on the other hand, the vessel were ordered to discharge at a Mediterranean port, it might be decided to load ore at South Spain for the Atlantic side of the United States. Thence, the vessel might be sent to South America

or to Montreal to load another grain cargo, or, if grain rates were low, it might be sent to South Africa and there load coal for a port in the Indian Ocean, at which point the ship could be chartered homeward with linseed kernels, be loaded for the United States with manganese ore at Vizagapatam, or ilmenite at Colachel, or be sent farther afield to the Far East or Australia, to load, say, copra, sugar, or chrome ore for the United States or Europe.

A general all-round design, rather than a specialized one which tends to restrict the kind of cargo that can be carried, is obviously the most suitable for the average tramp vessel which during its lifetime will trade in all parts of the world and may carry numerous different kinds of bulk or homogenous cargo. Study of the list of representative tramp-ship cargoes, which appears later in this chapter, will reveal the great variety of commodities that these vessels carry. One or two generalizations may be made as to the most suitable employment for certain types of tramp vessels. Shelter-deckers are best suited for the carriage of cargoes of relatively light weight and density, owing to their large cubic capacity. They are not commonly employed, for example, as ore carriers. Full-scantling vessels, or those more heavily built than shelter-deckers, are better suited for the carriage of dense ore cargoes, which fill only about 75 percent of the average three-island type vessel when loaded to its marks.

Important trades to the tramp shipowner include the carriage of nitrates from Chile, of phosphates from North Africa, of sugar from Cuba, Java, and Madagascar, of iron ore from Spain and North Africa, and the carriage of coal in the South African, Indian, and Australian coal trades. In none of these trades are the factors of loaded draft, size, or cubic capacity of great importance, except, possibly, that a light-draft steamer has an advantage in loading at Cuba, where some of the ports have not much water. The ordinary three-island single-deck ship is suitable for these trades, the shelter deck not being required.

The homeward trade from India usually takes fairly large carriers with good cubic capacity, and shelter decks and 'tween decks are an advantage. Draught is unimportant. The Far Eastern trade is also suitable for large carriers, and shelter decks and 'tween decks are an advantage. Many tramp ships are time-chartered to carry composite cargo for charterer's account, and frequently the ship most in favor is one that closely resembles the usual type of general cargo vessel. 'Tween decks, shelter decks, booms, and winches capable of handling heavy lifts, and good speed are factors of importance.

A widely used modern type of deep-sea tramp vessel is one of the shelter-deck type that carries approximately 9,500 tons deadweight of cargo, stores, and bunkers, with a speed of 11 or possibly 12 knots, having a triple-expansion steam reciprocating engine of 2,400 indicated horsepower, and boilers burning 25 tons of coal per day. A number of tramp ships of approximately the same deadweight carrying capacity, but with a speed of 14 knots, have also been placed in service. However, the extra speed requires an engine of 3,800 horsepower and a consumption of about 40 tons of coal per day. This frequently means that larger bunkers must be installed at the expense of cargo capacity and also, of course, increases the daily expense of operating the ship. The dimensions of a tramp ship of this capacity

would be approximately 415-foot length, 57-foot beam, 27 feet to the upper deck, and 36 feet to the shelter deck, with a draft of 25 feet 2 inches.

Many ships of this type are equipped to burn either coal or oil, the fuel used depending upon which costs less for a particular voyage or series of voyages. Other tramp ships of this size and contstruction are fitted with Diesel motors. The original cost of such a ship is greater than that of a steam-propelled vessel, but operating costs may be considerably lower if the cost of Diesel oil at fueling ports visited is relatively low. The other major advantage of a Diesel-propelled vessel is that it usually has a larger cargo-carrying capacity, owing to the smaller amount of bunker oil which has to be carried.

BALLASTING OF TRAMP SHIPS ON LONG VOYAGES

Tramp ships not infrequently are obliged to make voyages of considerable length without cargo and, as a consequence, must be provided with adequate ballast tanks. Many tramp ships in recent years have gone out from the United Kingdom to the River Plate in ballast or have proceeded light to the River Plate after discharging an outward cargo of coal at a Mediterranean port, Dakar, or the Canary Islands. Other tramps, after discharging a coal cargo at a Mediterranean port, proceed in ballast to the East Coast of Africa or to India to load their homeward cargoes. A valuable discussion of some of the problems that arise in connection with long voyages of this nature was contained in "Fairplay" (February 1, 1940, p. 214) and, because of the relative unavailability of the data presented, is reprinted herewith:

The general procedure was as follows: A winter North Atlantic voyage was assumed, and the ballast, in whatever form it might be, either coal, water, or solid ballast, was so placed as to trim the ship not more than four to five feet by the stern, and to immerse at least two-thirds of the diameter of the propeller. The examination of a number of voyages showed that the mean ballast draft at the start of the voyage was about 55 to 60 percent of the mean load draft, and that the average weight of ballast was about 36 percent of the total deadweight capacity of the ship.

Distribution and Trim.—To illustrate this, apply the above figures to a 10,000-ton deadweight shelter-decker, having a draft of 25 ft. 5 in. and a displacement of 13,400 tons, carrying 1,600 tons of water in the double-bottom and in the peaks and 900 tons of coal and stores. This represents only 25 percent of the total deadweight capacity of the ship, and is therefore insufficient to comply with the general conditions stated above. In order that it may do so it would be necessary to supply another 1,000 tons of ballast in some form, so distributed as to give a draft of 16 ft. 3 in. aft and 11 ft. 3 in. forward, giving a trim by the stern of 5 ft. If this is done the propeller will be about 80 percent immersed, and because of this the power developed will be reduced by something like 25 percent. To maintain the speed at 11 knots there would be no sensible saving of fuel as compared with that required for the fully loaded condition, since, although the ship is lighter, the engines are working under less efficient conditions due to the lack of immersion of the propeller.

Weight Concentration.—Then there is the case of a ballast voyage at the beginning of which a large amount of coal is carried for the ship's use. Here considerations of draft, trim and propeller immersion will not arise, at any rate to begin with; the danger is rather in a too great concentration of coal near the boilers, which may lead to crippling of the steel weather deck. Serious damage has been known to be caused by the concentration of too much weight in the middle of the ship on these long ballast voyages. The total concentrated weight, it has been suggested, should not exceed 20 percent of the total deadweight in ships of 2,500 tons gross, and 25 percent in ships of 5,500 tons gross and over. This concentrated weight, of course, does not apply to any other

distributed weights in the ship—such as the water ballast in the double-bottom—but would include the weight of all coal carried as close to the boilers as possible, the coal in spare bunkers (if any) forward of the boiler space, and the contents of deep tanks, if these are fitted.

TRAMP-SHIP CARGOES

The major cargoes carried by tramp vessels are coal, grain, and ore, although there are many other trades in which they operate, and a number of these are noted below. Coal is shipped from numerous United Kingdom and North European ports to South America, the Mediterranean, and other destinations, and in other quarters of the world many tramp ships carry coal from Durban to Indian and Far Eastern destinations, from Calcutta to other Indian and Far Eastern ports, and from Australian ports, chiefly Newcastle, to Chile, the Pacific islands, and other destinations. Some coal is shipped from Newport News, Baltimore, and other points, to South America. Anthracite coal has been shipped in considerable quantities in recent years from the United Kingdom to Canada and from French Indo-china to various destinations, including the Mediterranean and Montreal.

The major grain-shipping ports, at which large numbers of tramp vessels load each year, are those of Argentina, such as Rosario, Santa Fe, Ibicuy, and Bahia Blanca; the Canadian St. Lawrence ports of Montreal, Sorel, Three Rivers, and Quebec; various Australian ports; South Africa (Durban, Capetown, and Lobito Bay); French Morocco, and Danube and Black Sea ports. Tramp steamers sometimes load bulk cargoes of grain at United States Atlantic coast ports for European destinations, although in recent years this business has been chiefly handled by liners, also at Pacific coast United States and Canadian ports, these cargoes going largely to the Far East.

For the sake of brevity, other tramp cargoes—some 50 commodities in all—are listed below, without comment. They indicate both the variety of products which these vessels are called upon to carry and the world-wide range of their operations. The cargoes listed are not, of course, carried wholly by tramps. Many of them, such as grain and other cereals, especially wheat and rice, are carried in large quantities by liners, as are cotton, flour, lumber, copra, raw sugar, gunnies, and other of the commodities listed. The list of loading ports is representative, but not all-inclusive.

Notes on the stowage of practically all the cargoes listed below are given in the section, "Commodities and Their Stowage."

TRAMP-SHIP CARGOES

Asphalt in drums:
- Trinidad to South Africa.
- Trinidad to Australia.
- New York to Bombay/Karachi.
- Abadan (Iran) to South Africa
- Suez to Australia.

Basswood logs: Montreal to Sharpness.

Bauxite:
- British Guiana to United States and Canada.
- Dutch Guiana to United States and Canada.

Bauxite—Continued.
- Aghia Marina (Greece) to Port Alfred (Quebec).
- Dubrovnik (Yugoslavia) to Germany.

Case oil:
- San Francisco to Bangkok (Thailand).
- United States Gulf to Kohsichang (Thailand).
- United States Gulf to South Africa.

Castor seeds: Brazil to Japan.

Cement: Thames to Reykjavik (Iceland).
China clay: Fowey (Cornwall) to Continent and United States.
Cinders: L'Estaque to Antwerp/Ghent.
Cocoa: Bahia (Brazil) to Petsamo (Finland).
Concentrates: Fethiye (Turkey) to South France.
Copra:
- New Guinea to United Kingdom.
- Solomon Islands to United Kingdom.
- Rabaul (New Britain) to Mexico.
- Philippine Islands to United States.
- Philippine Islands to United Kingdom/Continent.
- Celebes to United States.
- Macassar (Celebes) to United Kingdom/Continent.

Corkwood: Lisbon to United States.
Cotton:
- United States Gulf to United Kingdom/Continent.
- United States Gulf to Japan.
- San Francisco to Japan.
- Port Sudan to United Kingdom.
- Santos to Shanghai.
- Mombassa (Kenya) to Marseille.
- Bombay/Karachi to United Kingdom/Continent.

Cottonseed: Alexandria to United Kingdom/Continent.
Cottonseed cake and meal:
- Santos to United States.
- Buenos Aires to Dublin.

Crushed bones:
- Bombay/Karachi to United Kingdom/Continent.
- Calcutta to Antwerp.

Dried fruit: Batoum (U. S. S. R.) to Rotterdam/Antwerp.
Esparto:
- Nemours (Algeria) to United Kingdom/Continent.
- Almeria (Spain) to Glasgow.

Flour in bags:
- Vancouver to Shanghai.
- Sydney (Australia) to Kingston, Trinidad, and Barbados.
- Sydney to Taku Bar.
- Puget Sound to Dairen (Manchuria).

Fruit (oranges and lemons): South Spain to United Kingdom.
Gasoline in drums:
- United States Gulf to Japan.
- Los Angeles to Taku Bar.

Groundnuts (Peanuts):
- Dakar (Senegal) to France.
- Kaolak (Senegal) to France.
- Saloum (Senegal) to Bordeaux.
- Bissao (Portuguese Guinea) to Aarhus.
- Ziguinchor (Gambia) to Marseille.

Groundnut kernels:
- Madras Coast to United Kingdom/Continent.
- Malabar Coast to United Kingdom/Continent.

Gunnies:
- Calcutta to Argentina.
- Rangoon/Calcutta to West Africa.

Gypsum: Dingwall (Nova Scotia) to New York.
Jute:
- Calcutta to North Spain.
- Calcutta to United Kingdom/Continent.

Licorice root:
- Basrah (Iraq) to United States.
- Alexandretta to United States.
- Izmir (Turkey) to United States.

Linseed:
- Buenos Aires to Montreal.
- Concepcion/Ibicuy (Argentina) to New York.
- Rosario/Santa Fe (Argentina) to St. Lawrence.
- Montevideo to United States.

Linseed cake: Buenos Aires to Dublin.
Lumber (Timber):
- British Columbia to Alexandria/Haifa.
- British Columbia to Marseille/St. Louis de Rhone.
- British Columbia to Port Sudan.
- British Columbia to Capetown/Walvis Bay range.
- British Columbia to Japan.
- British Columbia to Australia.
- Puget Sound to Japan.
- United States Gulf to United Kingdom.
- Rumania to Lourenco Marques/Capetown.
- Danube ports to Syria/Egypt.
- Rimouski (Quebec) to United Kingdom.
- Miramichi (Quebec) to Belfast (Spruce).
- Halifax to Preston (Spruce).
- Constanza (Rumania) to United Kingdom.
- Constanza to Tripoli (Libya).
- Murmansk (U. S. S. R.) to United Kingdom.
- Igarka (Northern Siberia) to United Kingdom.
- Western Norway to Boston.
- Kotka (Finland) to West Hartlepool.
- Jakobstadt (Finland) to Sunderland.
- Kasko (Finland) to King's Lynn.

Mahogany:
- Grand Bassam (Ivory Coast) to New York.
- British Honduras to United States.
- Haiti/Dominican Republic to New York.

Newsprint:
- St. Johns/Botwood (Newfoundland) to Buenos Aires.
- Botwood to United Kingdom.
- Cornerbrook (Newfoundland) to Australia.
- Botwood to Vera Cruz (Mexico).
- Quebec to London.

Nitrate of soda:
- Hopewell (Virginia) to British Columbia.
- Hopewell to Colombo.
- Hopewell to Alexandria.
- Hopewell to La Pallice (France).
- Chile to United States and United Kingdom/Continent.

Oats: Chile to Genoa.

Oil cake:
- Caronte/Marseille to Denmark/Sweden.
- Black Sea ports to Denmark.

Okume wood: French Gabon to Germany.

Onions: South Spain to United Kingdom.

Ores:
- Freetown (Liberia) to United States (chrome ore).
- Santa Cruz, Zambales (P. I.) to United States (chrome ore).
- Masinioc, Zambales (P. I.) to United States (chrome-bearing iron ore).
- India to Japan (manganese).
- Santa Fe (Argentina) to Montreal (zinc concentrates).
- Karachi to United States (chrome ore).
- Morphou Bay (Cyprus) to Dairen (Manchuria).
- Morphou Bay to Hamburg (concentrates).
- Morphou Bay to China/Japan (copper concentrates).
- Mersin (Turkey) to United States (chrome ore).
- Cochin/Colachel (South India) to New York (ilmenite ore).
- Newfoundland to Boston (iron ore).
- Botwood (Newfoundland) to New Orleans (concentrates).
- Botwood to Bordeaux (zinc concentrates).
- Wabana (Newfoundland) to Rotterdam (iron ore).
- Chile and Peru (6 ports) to New York.
- Cruz Grande (Chile) to United States.
- Huelva (Spain) to United States (pyrites).
- San Juan (Spain) to United Kingdom.
- Setubal (Portugal) to Antwerp (pyrites).

Ores—Continued.
- New Caledonia to United States (chrome ore).
- New Caledonia to Rotterdam (chrome ore).
- Lourenco Marques (Mozambique) to Montreal (chrome ore).
- Lourenco Marques (Mozambique) to Montreal (chrome ore).
- Beira (Mozambique) to United States/United Kingdom.
- La Goulette (Tunis) to France.
- Bougie (Algeria) to Middlesbrough.
- Bona (Algeria) to Barrow.
- Benisaf (Algeria) to Philadelphia.
- Melilla (Morocco) to Ymuiden.
- Casablanca (Morocco) to United Kingdom (pyrites).
- Casablanca to Zongouldak (Turkey) (managnese).
- Walvis Bay (Southwest Africa) to Tampico.
- Matadi (Belgian Congo) to United States.
- Takoradi (Gold Coast) to Boulogne (manganese).
- Takoradi to United States and Canada (manganese).
- Durban to Antwerp/Rotterdam (manganese).
- Durban to United States (manganese).
- Quilon (India) to Baltimore (ilmenite).
- Agua Amarga (Chile) to United States.
- Vizagapatam (India) to Baltimore (manganese).
- Vizagapatam to Irlam (England) (manganese).
- Vizagapatam to Japan (manganese).
- Marmagoa (India) to Antwerp/Dunkirk (manganese).
- Koilthottam (India) to New York (ilmenite ore).
- Poti (U. S. S. R.) to Ymuiden (manganese).
- Poti to Marseille (manganese).
- Novorossisk (U. S. S. R.) to United Kingdom/continent.
- Novorossisk to United States.
- Port Pirie (West Australia) to United Kingdom (zinc concentrates).
- Seriphos Island (Greece) to Rotterdam (iron ore).
- Sinai Peninsula to Germany (manganiferous ore).
- Rio de Janeiro to Sydney (C. B.) (manganese).
- Rio de Janeiro to Antwerp/Rotterdam (manganese).
- Rio de Janeiro to United States (manganese).

Ores—Continued.
- Victoria (Brazil) to Yawata (Japan) (manganese).
- Tampico to Caronte (France) (zinc concentrates).
- Salonica to Caronte.
- Spalato (Yugoslavia) to Rotterdam.
- Narvik (Norway) to United Kingdom.
- Brittania Beach (British Columbia) to eastern United States (pyrites).

Oyster seeds: Japan to Willapa Bay (Washington, U. S. A.).

Palm kernels: Madras Coast to United Kingdom/continent.

Pebbles: France to Hubbell, Michigan.

Petroleum coke: Los Angeles to Japan.

Phosphates:
- Bona (Algeria) to Cork.
- Tunis to Setubal (Portugal).
- Tunis to Rotterdam.
- Tunis to New Zealand.
- Ocean Island/Nauru to United Kingdom.
- Ocean Island/Nauru to Japan.
- Sfax (Tunis) to Colombo or Port Swettenham.
- Sfax to Nantes/Rouen.
- Casablanca to Rieme.
- Saffi (Morocco) to France.
- Makatea (Low Archipelago) to Japan.
- Kosseir (Egypt) to London/Antwerp.
- Safaja (Egypt) to Japan.
- Barcelona to United Kingdom.

Phosphate rock:
- Tampa to Lisbon.
- Tampa to Garston.
- Boca Grande (Florida) to Japan.
- Fernandina (Florida) to Setubal.

Pig iron:
- Calcutta to Glasgow.
- Calcutta to Japan.
- United Kingdom to Marseille.
- Newcastle/Port Kembla (Australia) to United Kingdom.

Pit props:
- Lisbon to Liverpool.
- Scandinavia to United Kingdom.

Pitch:
- Newark (N. J.) to Haiphong.
- Nicolaieff (U. S. S. R.) to Sete (France).
- Nicolaieff to Ghent.

Potash:
- Los Angeles to Japan.
- Barcelona to Japan.

Potatoes:
- St. John (N. B.) to Buenos Aires.
- Scottish ports to Wisbech (England).
- New Zealand to River Plate.

Pulpwood:
- Gaspe to Baltimore.
- Newfoundland to Rotterdam.
- Scandinavia to United Kingdom.

Quebracho:
- Argentina to United States.
- Lisbon to United Kingdom.

Railroad ties, untreated: British Columbia to Alexandria.

Rice:
- Burma to United Kingdom/Continent.
- Rangoon to Shanghai.
- Bangkok (Thailand) to Cuba.
- Kohsichang (Thailand) to Shanghai.
- Saigon to Marseille.
- Saigon to India.
- Saigon to North Africa.
- Saigon to West Africa.
- Saigon to United Kingdom/Continent.

Rice bran: Rangoon to Liverpool.

Salt:
- Turks Island to Japan.
- Dominican Republic to Japan.
- New Orleans to Japan.
- North Brazil to Japan.
- Oakland/San Francisco to Japan.
- Kundla (northwest India) to Calcutta.
- Navalakhi (northwest India) to Calcutta.
- Kathiawar (northwest India) to Calcutta.
- Porbundar/Karachi to Calcutta.
- Port Okha (northwest India) to Calcutta.
- Torrevieja (Spain) to Japan.
- Aden to Chittagong.
- Cadiz to St. Johns (Newfoundland).
- Venezuela to Japan.
- Brazil to Japan.
- Massawa (Eritrea) to Japan.
- Assab (Eritrea) to Japan.
- Port Said to Antwerp/Rotterdam.
- Alexandria to Japan.
- Cagliari (Sardinia) to Iceland.
- Cagliari to St. John (N. B.).
- Hafun (Italian Somaliland) to Japan.

Scrap metal:
- Brazil to Montreal.
- United States to Europe and Japan.
- Buenos Aires/Montevideo to Japan.

Sisal:
- Progreso (Yucatan) to Plymouth (Mass.).
- Progreso to United Kingdom/Continent.

Soybeans:
- Dairen (Manchuria) to United Kingdom/Continent.

Soybeans—Continued.
- Rashin (Chosen) to Rotterdam/-Hamburg.
- St. Lawrence (Canada) to Copenhagen/Karlshamn.

Steel bars: Nova Scotia to Dairen (Manchuria).

Steel billets: Sydney (C. B.) to Vancouver.

Steel rails:
- Sydney (C. B.) to South Africa.
- San Francisco to Persian Gulf.

Steel wire rods: Baltimore to Dublin.

Sugar:
- Java to Piraeus/Istanbul.
- Java to Chile.
- Java to Persian Gulf.
- Java to India.
- Java to Casablanca.
- Java to Rotterdam.
- Cuba to United States.
- Cuba to United Kingdom/Continent.
- Cuba to Casablanca.
- Cuba to Vladivostok.
- Maceio (Brazil) to Casablanca.
- Recife (Brazil) to Beirut/Port Said.
- Brazil to Persian Gulf.
- Dominican Republic to United States.
- Dominican Republic to United Kingdom/Continent.
- Puerto Rico to United States.
- Peru to Casablanca.
- Peru to United Kingdom/Continent
- Queensland (Australia) to United Kingdom.
- Queensland to Hongkong.

Sugar—Continued.
- Durban to United Kingdom.
- Durban to Montreal.
- Fiji to United Kingdom.
- Philippine Islands to United States.
- Rotterdam to Karachi/Colombo range.

Sulfate of ammonia:
- Baltimore to Lisbon.
- British Columbia to Australia.
- Novorossisk (U. S. S. R.) to New Orleans/Baltimore range.

Sulfur:
- United States Gulf to Lisbon.
- United States Gulf to Capetown/Durban.
- United States Gulf to Australia/New Zealand.
- United States Gulf to Santos, Montevideo, and Buenos Aires.
- Licata (Sicily) to Hamburg.
- Sicily to Australia.
- Ancona (Italy) to Garston.

Superphosphates:
- Barcelona to United Kingdom.
- Baltimore to Durban.
- Baltimore to Rio de Janeiro.

Telegraph poles:
- Melbourne to Suez.

Woodpulp:
- Sheet Harbor (Nova Scotia) to Grimsby.
- Larvik (Norway) to Rouen.

Zinc concentrates:
- Port Pirie (Australia) to United Kingdom.
- Santa Fe (Argentina) to United States.
- Santander (Spain) to Baltimore.

CHARACTERISTICS OF TRAMP VESSELS EMPLOYED IN CARRYING GRAIN

In many single-deck vessels designed especially for carrying grain, the hatch coamings are made deep so as to form a feeder from which the grain may work downward and fill any vacant spaces created by the settling of the grain in the hold during the voyage. The hatch coamings may be any height up to 5 feet or more, the actual height being regulated by the requirement that the space enclosed by the coamings shall be at least 2 percent of the hold space below.

Turret-deck and trunk-deck vessels have been favored at various times for the carriage of grain in bulk. Turret-deck vessels, owing to their rounded gunwales and numerous hatchways, may be filled full of grain without any hand-trimming, and, despite their having only one deck, they carry grain safely because the large central trunkway forms a very efficient feeder. Trunk-deck vessels are practically of ordinary design, except that they have what might be described as a continuous hatchway, having coamings about 7 feet high, decked over on top. Like turret-deck vessels they are suitable for carrying grain in bulk, the trunk forming an excellent feeder.

In vessels which constantly carry grain in bulk the sides of the grain holds are sometimes closely ceiled with wooden cargo battens and the seams chintzed or calked by working in oakum with a knife

blade or chintzing iron, in order to prevent the grain from working down into the bilges.

In many modern vessels built specially for the grain trade, permanent steel bulkheads running fore and aft, except in way of the main hatchways, have been fitted to divide the holds along the center line and prevent shifting of the cargo. These bulkheads take the place of the temporary wooden bulkheads that are commonly used on the usual tramp vessel.

An interesting discussion of the types of tramp vessels most suited for the various major grain trades is contained in a paper prepared by W. Stanley Hinde.[3] The discussion of the various trades and their requirements follows:

(a) From Montreal, North Atlantic U. S. A. ports, and ports in the Gulf of Mexico, to the United Kingdom, Continent, or Mediterranean.—In this trade, loaded draft is not an important factor, and there seems to be no limit to the size of cargoes available for shipment. Cubic capacity is occasionally important in case the cargo is composed of light grain. A shelter or bridge deck is often advantageous for the accommodation of parcels of bag cargo which may require to be shipped.

(b) From the River Plate or Bahia Blanca to the United Kingdom, Continent, or Mediterranean ports.—This trade, as far as loading is concerned, divides itself into two categories, namely, the ship that can load up-river, or the ship that must load in part up-river and complete at the lower ports on account of draft of water. 23 ft. 6 in. loaded draft would appear to be the limit on which one can base, if it is intended to be in a position to complete loading at the up-river ports on as many occasions as possible, although there are, of course, times when there is insufficient water for a vessel like this. In the River Plate trade there is also usually useful employment for the handy-sized steamer of, say, 6,000/6,500 tons d. w., and there is a certain amount of business for the large carriers of, say, 9,000 tons d. w. from the lower ports. The main business, however, is for the 7,000/8,000 tons d. w. ship.

(c) From South Africa, there are seasonal shipments of maize to the United Kingdom or Continent, and here the size mostly in favor is from 6,000/8,000 tons d. w. There are no troubles in the matter of loaded draft, but cubic capacity is sometimes important, when the maize is light.

(d) From Australia to the Mediterranean, Continent, or United Kingdom.—This business would appear to be going definitely in favor of the large carrier. Good capacity is important, but loaded draft is unimportant.

(e) Grain from the Pacific ports to the United Kingdom or Continent is a trade in which the outward voyage has often to be made in ballast owing to a lack of cargoes from this side to that direction, and the 8,000/9,000 ton d. w. open shelter-deck or long bridge steamer is the type usually employed. There is no restriction in the matter of draft.

(f) Grain from Danube and Black Sea.—From the Danube 23 ft. draft is most suitable, and there is good demand for ships of 6,000/7,000 tons d. w. From the Black Sea ports cargoes have recently been available up to 9,000 tons. Cubic capacity is not important.

REFRIGERATED SHIPS

The increase in the volume of refrigerated cargoes moving in oversea trade has been one of the most outstanding of recent developments in ocean shipping, and a very large number of refrigerated vessels or, as they are commonly termed, "reefers," have been built to carry these classes of cargo. There have also been marked improvements in the refrigerating equipment installed on board these vessels, which permit the maintenance of more constant and uniform

[3] Hinde, W. Stanley. The Ocean-Going Tramp Steamer From the Owner's Point of View. A paper read before the Northeast Coast Institution of Engineers and Shipbuilders, Newcastle-on-Tyne, November 28, 1930.

temperatures throughout the refrigerated chambers than was formerly possible.

CLASSES OF REFRIGERATED CARGO

There are three general classes of refrigerated cargo, each requiring its own system of refrigeration and a vessel specially equipped for its carriage. These classes are (1) frozen cargo, such as frozen mutton and lamb, beef, and rabbits, which are carried in the hard frozen condition at temperatures ranging from about 10° to 15° F.; (2) chilled cargo, principally beef, chilled so that only a thin outside layer of the meat is frozen and usually carried at a temperature of 28½° to 29½° F., though other temperatures may be specified by the shipper; and (3) air-cooled cargo, principally fresh fruits, which, as indicated in the section on Refrigerated Cargoes in chapter IX, Stowage of Special Cargoes, are carried at a number of different temperatures, according to the nature of the fruit, its condition at time of shipment, and other factors.

The principal frozen and chilled meat trades are those from Australia, New Zealand, and the River Plate to the United Kingdom and the continent of Europe, and many specially designed vessels have been built to serve these routes. Fresh fruits are carried in large quantities from the Pacific coast of North America to the United Kingdom and Continent, and also from South Africa, Australia, New Zealand, Tasmania, the Mediterranean, and the east and west coasts of South America. The latter regions are also developing an increasing trade in fresh fruits with the United States.

A specialized division of the fresh-fruit trade is the carriage of bananas. Some bananas are carried under refrigeration on general cargo vessels, but the bulk of this trade is handled by special vessels built to service the principal banana trades, namely, those between Central America, northern South America, and the West Indies, and the United States and United Kingdom/Continent; and between West Africa and the Continent.

TYPES OF REFRIGERATED SHIPS

Most refrigerated ships have been designed to engage in one trade only, but other vessels, usually designated as general refrigerated ships, have been so equipped that they are able to carry all types of refrigerated cargo. In addition, practically all modern cargo liners and passenger liners, and even some vessels designed primarily for tramping service, are provided with one or more refrigerated compartments to enable them to carry small lots of refrigerated cargo as well as the customary general cargo. Consideration is given below to the principal types of refrigerated ships now engaged in oversea trade.

Frozen-Meat-Carrying Ships.—Frozen-meat-carrying ships, apart from the insulation fitted on the sides of the holds, bulkheads, and underside of decks to prevent dissipation of the cold air through contact with warmer metal parts, and the installation of a cooling plant, differ very little in constructional details from the ordinary cargo carrier. Frozen meat is carried in bulk; and roomy, well-insulated holds are the primary requirement. Very heavy insulation is needed to keep the cargo in good condition, but frozen-meat carriers do not require as many cooling pipes as do chilled-meat ships.

The usual system of refrigeration is by means of cooling pipes fitted to all sides of the cargo compartments except the floor, through which cold brine is circulated. The cooling pipes are fitted in "grids," that is, individual sections of piping, each having its own supply and return pipes to bring brine from the evaporator and return it to the brine tank. For this reason, these vessels are frequently referred to as "grid ships."

There are two principal methods of cooling the brine—the CO_2 and the NH_3 methods. In the former, carbonic acid is compressed and it is technically known as the carbonic-anhydride system. A gas is formed when the acid is compressed in a cylinder, thus increasing its temperature. The heated gas is then cooled, changing it back into a liquid form, reducing its volume, and causing it to lose a certain amount of heat. In this state it is directed into the evaporator coils, which are placed in the brine tanks, where the liquid is changed back into its former gaseous state. The change from the liquid to a gas brings about an increased volume and a decreased pressure, causing it to absorb the heat of the brine immediately surrounding the coils. The brine is then sent through the pipes into the various compartments. The NH_3 method, or ammonia system, operates on the same principle, with the exception that ammonia gas instead of carbonic acid is used.

The refrigerated compartments are insulated on all sides, including the floor, by means of granulated cork, charcoal, silicate of cotton or some other nonconducting material. Slag cork set with cement or a hot tar preparation has been used in a number of vessels. A wood sheathing is fitted over the insulating material to provide a smooth surface. Wooden battens are usually put in place over the brine pipes to prevent contact between the cargo and the pipes. These are generally portable so they can easily be removed to permit access to the pipes for inspection, cleaning, repairs, etc.

Thorough and effective insulation of all exposed steel pipes is needed to prevent the cargo from touching any steel work and also to enclose the steel, which is a conductor of heat. Local defects in the insulation, if large enough, would prevent an even temperature being maintained and increase the refrigeration cost, since they would necessitate the refrigeration machinery being operated at a higher speed. The weight of the insulating material decreases the vessel's deadweight capacity, it being estimated at about 10 percent of the average refrigerated vessel's displacement tonnage. On the return voyage, as from the United Kingdom to Australia or the River Plate, during which the ship carries general cargo, this added weight may operate at a disadvantage with respect to the vessel's earnings. It is unavoidable, however, since classification societies consider this part of a refrigerated vessel's construction so important that they have issued special rules and regulations concerning its installation and maintenance. Periodical examinations are made of the insulation and of the refrigerating machinery, and certificates are issued after each inspection, stating the official rating, which is of importance to both shippers and marine underwriters in determining the condition of the vessel's equipment and the possibility of damage occurring because of defects.

Frozen-meat-carrying ships are provided with means for hermetically sealing each compartment to prevent the entrance of warm,

moisture-laden air, which would cause the brine pipes to become coated with frost or ice and thus reduce their efficiency.

Chilled-Meat-Carrying Ships.—Chilled-meat-carrying ships are usually provided with two or three 'tween decks and shallow lower holds, since quarters of chilled meat are stowed in a hanging position, being suspended from hooks fastened to rails fitted between the overhead cooling pipes, and the height of 'tween decks and holds is adjusted to conform to the usual length of a quarter of beef suspended in this manner. These ships are consequently fitted with as many decks as possible in conformity with other requirements of design, and each deck is subdivided into a number of small compartments, since it is easier to maintain uniform temperatures in small compartments than in large. Some of the chilled-meat ships in the United Kingdom–River Plate trade have as many as 160 independent refrigerated cargo spaces.

The suspension method of carrying chilled meat means that the entire weight of the cargo in each compartment is borne by the deck above, instead of being distributed over the bottom of the hold or 'tween deck, as in the ordinary cargo vessel. To provide for this method of stowage, chilled-meat carriers are fitted with heavier deck beams, girders, and pillars than are ordinary cargo ships.

Chilled meat requires the maintenance of a constant temperature which must be as uniform as possible throughout the compartment. For this reason the refrigerated chambers on these ships are much more heavily piped than those on frozen-meat ships. The "grid" system of brine pipes is used, which has already been described, and means are provided for hermetically sealing each refrigerated chamber. It is important that the brackets supporting the overhead rails to which the quarters are hung be thoroughly insulated at their upper connections to prevent them from acting as conductors of heat and so causing a softening of the meat where it contacts the hooks.

In carrying chilled beef from New Zealand and Australia to United Kingdom and Continental ports, the so-called "gas storage" method, in which the composition of the atmosphere as well as the temperature in the refrigerated chambers is controlled, is employed. In this method, first used in 1933, carbon dioxide is introduced into the chambers in sufficient quantity to equal about 10 percent of the total atmospheric content. The use of this process requires that the chambers be gas-tight, or so constructed that leakage of air is reduced to a minimum. In new vessels constructed for the Australian and New Zealand trades the provision of gas-tight refrigerated space is now a matter of course and many compartments in older ships have been reconstructed.

Prior to the introduction of the "gas storage" method, all beef brought from Australia and New Zealand was carried in the hard, frozen condition, the voyage being too long to permit carriage in the chilled condition with temperature control alone. Chilled beef from South America, on the other hand, does not require "gas storage" as the passage takes only about half as long as that from Australia.

Some of the vessels specially constructed for the River Plate–United Kingdom chilled-meat trade are equipped with cargo-handling devices which insure exceptionally rapid loading and discharge.

For example, one vessel typical of this class which measures 9,100 tons gross and has 500,000 cubic feet of refrigerated space, has seven cargo hatch openings, each of which is so arranged as to serve at least three refrigerated compartments simultaneously. There are 24 cargo booms and 24 winches, capable of lifting from 6 to 12½ tons each, and the latter can be combined so that it is possible to handle lifts up to 25 tons. The deck machinery and the number of hatch openings are unusual in cargo carriers of this size. Additional rapid handling is secured by so arranging the cargo booms that loading and discharging operations may be carried on simultaneously over both sides of the ship.

Fruit-Carrying Ships.—The refrigerated compartments of vessels specially designed for the carriage of fresh fruits are cooled by means of cold air kept in constant circulation through the compartments by means of fans. Extractor fans withdraw the heated and moisture-laden air from the compartments and pass it through coolers where it is cooled and dried, after which it is returned to the refrigerated compartments by supply fans which force it through ducts leading to the compartments.

A recent survey of 65 Danish ships built specially for the carriage of fresh fruits showed that 15 used a direct expansion ammonia system to cool the circulating air, and the others used a brine-cooling system, about equally divided between carbon dioxide and ammonia.

Nearly all the plants on these ships had three temperatures available in the brine system, one for temperatures below the freezing point. The final cooling of the cargo was accomplished by circulating the cold air through ducts leading to the refrigerated compartments from two or more central cooling and fan rooms. The ducts lead along the sides of the ship for delivery on one side and return on the other. In most of the ships the holds and 'tween decks were divided into 10 individual compartments, each independent of the others as to temperature.

To permit thorough, unobstructed circulation of the cold air to all parts of the cargo, the refrigerated compartments on fruit-carrying ships should be constructed with the smallest possible number of projecting parts, such as brackets, side stringers, and hatch coamings, which might interfere with the air circulation and permit heated air to collect in pockets.

In connection with the carriage of fresh fruits, it must be borne in mind that such fruits, even when cooled, are still living organisms that breathe in oxygen and give off carbon dioxide. This results in the accumulation of carbon dioxide in the air that is being circulated through the compartments and from time to time, usually when the carbon dioxide content of the air exceeds 8 or 10 percent, some of the air is discharged into the atmosphere and replaced by fresh outside air, which is led to the cooling rooms and dried and cooled before entering into the stream of circulating air.

To avoid penetration of taint or mold spores, the insulation on some of the recently constructed fruit ships has been faced with sheet zinc held in position by butt straps jointed down on mastic material.

Banana ships.—Banana-carrying ships are "cold air" vessels, the air being blown through the holds and 'tween-deck spaces in trunks at a temperature of 50° to 60° F., and withdrawn by fans. The air is changed at intervals to prevent the air in circulation from becoming

tainted. The carrying temperature is usually from 53° to 55° F., and it must be closely controlled if damage to the fruit is to be avoided.

On the specially constructed ships which carry the great bulk of American and European banana imports, each deck is divided into bins. Permanent uprights are fitted from deck to deck at about 10-foot intervals both fore and aft and athwartships. The sides of these are slotted to take portable battens, while the deck is fitted with portable gratings about 3 inches deep. A bin is thus about 10 feet square, with the battens forming the sides, and the gratings forming the bottom. The average deck carries about two heights of bananas, which are stowed on their ends, sometimes with one tier on the flat on top. It is not satisfactory to stow bananas more than approximately 7 feet high.

In the lower holds when two heights have been stowed, battens are fitted in the permanent uprights, then gratings are laid; and then another two heights of bananas are stowed, or sometimes three—according to the type of banana. This method prevents the fruit from being crushed. When a hold is filled, the hatches are sealed with insulated plug hatches. The loading is commenced in the lower holds in the wings, and as each bin is filled, the side battens are set in place, thus forming another bin, and so on.

General Refrigerated Ships.—General refrigerated ships, such as those which carry mixed cargoes of cheese, eggs, fruit, frozen meat, rabbits, and butter from Australia and New Zealand to the United Kingdom, must be so equipped that they can be utilized for the simultaneous carriage of all these products. Their arrangement differs from that of the South American meat-carrying vessels principally in that deep lower holds are fitted, instead of the shallow holds necessary in South American ships for the convenient stowage of chilled meat. To enable them to carry all the varieties of produce mentioned, they must be capable of circulating brine at three different temperatures, at least, and the latest ships have the majority or all of their insulated spaces cooled primarily by air circulation. In the recent cargo and passenger motorships completed for this trade, arrangements are made for the simultaneous circulation of brine at no less than six distinct temperatures.

ORE-CARRYING VESSELS

Many average type tramp ships carry ore, as well as coal, grain, and other bulk cargoes. At the same time, however, a number of specially designed ore-carrying vessels have been constructed for particular trades, chiefly those between the Swedish ore ports and continental Europe, and between Chilean ore ports and the United States. The characteristics of these vessels are briefly described below.

Iron ore and many other ores are very dense cargoes, which stow in pyramid-like heaps, putting the ship down to its load line with the hold probably 75 percent full. The weight of the cargo, its distribution in separate heaps throughout the ship, and the fact that ore is usually dumped into a ship a carload or more at a time, impose an unusual straining action on the structure of a vessel. Consequently, if a tramp ship is to be employed in the ore trade, either regularly or intermittently, it is a common practice to embody

special strengthening. A discussion of this subject, contained in Fairplay (March 28, 1940) is given below.

The ordinary cargo tramp is designed to carry cargo which stows at the rate of about 50 to 60 cubic feet to the ton, which is evenly distributed throughout the hold, and is loaded with some degree of care. If these limitations are not too widely overstepped, then all is well, but the trouble with the iron ore trade is that none of the conditions of normal service are satisfied. At some of the loading ports a cargo of 9,000 tons of ore can be shot on board in three or four hours, and the effects of this avalanche on the ship's structure must be appreciable. Then, as is well known, iron ore is about four times as heavy as a normal cargo, or almost three times as heavy as coal, and, when a ship goes to sea with a relatively small pile of this intensely heavy cargo in the bottom of each hold, usually severe straining action is induced, with consequent damage to well-defined parts of the hull. To counteract this abnormal disposition, it is usual to strengthen the construction of the double bottom of the ship, to close up the frames, and to increase the riveting of the hull. Obviously, the normal cargo ship has none of these features in her construction, and, furthermore, it is not unknown for ships specially built for the trade to show signs of damage.

As can easily be imagined, a normal cargo ship with a cargo of ore in the bottom of the holds, in addition to being exposed to racking and other forces, is far from comfortable for the crew, owing to the unnaturally rapid period of rolling, and to ameliorate this state of affairs some of the ore cargo is occasionally stowed in the tween-decks. If this is not done carefully, there is a strong probability that the deck may come down, on account of the unusual density of the cargo. (NOTE.—An instance of this nature occurred very recently when a shelter-deck vessel was being loaded at a Norwegian ore port. In an effort to make the ship sea-kindly, a certain proportion of the cargo was loaded on the second-deck hatches, with the result that the second deck, which was never designed to stand treatment of this nature, collapsed completely in one hold.) It would appear, therefore, * * * that even an isolated voyage with a cargo of ore may, if unfavorable weather conditions are experienced, have serious effects on an ordinary cargo ship, and even if there is no damage apparent at the time, the seeds of future trouble may have been sown.

The specially designed ore-carrying vessels have several very interesting features. Owing to the density of ore and the way in which it stows, the center of gravity of the cargo in a loaded ore ship is considerably lower than that of a similar ship loaded with a more nearly average type of cargo. As a result, the center of gravity of the whole ship is lowered and the vessel is given an excessive metacentric height. This increase in metacentric height increases the vessel's stability, but produces an extremely short period of roll. The resulting rapid and often violent reversals of motion tend to produce severe racking stresses in the structure of the ship.

To overcome this tendency, the bottoms of the holds in the specially designed ships are raised a considerable distance above the bottom of the ship. In one group of ships, the bottoms of the holds are 14 feet above the bottom of the vessel. The ore holds are also considerably narrower than the ship's hull, and this makes the rolling motion of the ship easy and regular. The machinery in these vessels is located aft in order to leave a free uninterrupted space for the cargo holds.

COLLIERS

Owing to its density, coal can usually be stowed in such a manner as to leave a certain amount of empty space in the 'tween decks of the average tramp vessel when the latter has been loaded down to its marks. This makes for good sea-keeping qualities and, ordinarily, little trouble with regard to stability is encountered in connection

with oceangoing tramp ships engaged in the coal trades. There is, of course, danger of fire, and this is discussed elsewhere in the present volume.

The tramp ship that carries coal from the United Kingdom or the United States to South America or on other long deep-sea hauls is usually of the general service type, with engines amidship and with no special modifications of design incorporated specifically to fit the vessel for the carriage of coal. It is true that a 'tween-deck steamer is less suitable than a single-deck vessel for carrying coal, but there is not much limitation on size or draft, on the question of cubic capacity, or whether the ship should be a shelter-deck ship or a single-deck ship.

In the United States, United Kingdom, and Australian coastwise trades, and in the short-haul trades between the United Kingdom and Scandinavian, French Atlantic, and other ports there are many specially designed colliers which possess certain unique features of design and equipment to fit them for their highly specialized trade.

Many of these ships must ordinarily make their return voyages in ballast, and for this reason they are fitted with extra large fore and aft peak tanks and double-bottom tanks. Extra ballasting arrangements are provided in a number of these ships by the installation of so-called topside ballast tanks. These are triangular compartments built in between the underside of the main deck and the ship's sides. These tanks, the construction of which contributes materially to the transverse strength of the ship, do not occupy much potential cargo-carrying space, since coal, when loaded by gravity, stows in heaps that are somewhat pyramidal. Furthermore, when coal is loaded into a ship in such quantity as to put it down to its load line, the space occupied by the coal, on the average, will be only about five-eighths of the total cargo space. In single-deck ships or in ships having a single tier of 'tween decks, the topside ballast tanks bind the hull structure together transversely to such an extent that, ordinarily, no hold pillars are required. This provides clear, unobstructed holds that greatly facilitate loading and unloading, thus helping to reduce the vessel's time in port.

Another method that is used in this type of ship to provide clear, pillarless holds is the use of the arch principle of construction. In this type of construction the top parts of the ship's frames are bent inward. The top part of the ship's midsection thus forms a transverse arch, which tends, as in the case of the topside ballast tank system, to bind the hull transversely. This construction also permits the depth of hold to be materially increased.

A great number of coastwise and short-sea colliers have their engines placed aft to provide an uninterrupted cargo space and eliminate the occupation of cargo space by the shaft tunnel. Many other such vessels, however, have their engines amidship and in a number of these the loss of space because of the shaft tunnel is offset by raising the aft deck to the same level as the bridge deck amidship. This type of ship—the raised quarter-deck type—has already been mentioned. Such ships were first designed and built on the northeast coast of England, the shipping point for the coal mines of the Tyne region.

Hatches on colliers are made as large as possible, consistent with the limits of structural safety. On short-sea colliers, the breadth of

the hatches is commonly from 65 percent to, in some cases, 75 percent of the molded breadth of the vessel. Especially wide hatches are desirable in these ships since they regularly load at tips and are unloaded by grabs, and the speed of loading and unloading is materially increased when wide hatches are available.

With colliers of this class, the loading is practically always the same, and there is little opportunity for the ship's officers to make any alterations in the disposition of the cargo which will have a marked effect on the stability. In this instance, the proportions of the ship weigh more heavily than in the case of the general cargo carrier. Modern vessels of this type are built with broader beams and lesser depth than was customary in the early years of the century, and the stability has been greatly improved by these alterations in design.

SEAWORTHINESS OF COLLIER TYPES

A paper by L. C. Burrill [4] contains much valuable information on this subject, and for that reason excerpts stating some of the author's chief conclusions are quoted herewith.

From the point of view of general seaworthiness and sea-kindliness, the author places the various types of colliers in the following order: Three-island type; well-deck type (raised quarter-deck with engines amidship); arch colliers; raised quarter-deck type with engines aft.

Three-island type.—The three-island type, with single continuous deck fore and aft, is the most seaworthy, although not very much superior to raised quarterdeck ships with engines amidships. In these ships the forecastle minimizes the amount of water shipped forward, the raised poop serves as a protection against following seas, and the midship houses divide the ship in such a way that any water shipped is usually confined to either the after or forward well.

Well-deck type (raised quarter-deck, engines amidships).—The disadvantage possessed by this type is that the forward well is likely to carry more water than the three-island type, owing to the decreased local freeboard. If a raised poop is not fitted they are also more likely to "dip" their sterns. A very good feature in these ships is the practice of raising the double bottom in the after hold to tunnel height, thus giving good ballast capacity and good ballast trim.

Arch colliers.—These ships, having inverse sheer, possess more freeboard at amidships than other types, and in moderate weather are less wet and roll easily, but with heavy head seas they carry large quantities of water on the fore-deck, since the water must run forward to free the deck and frequently meets the next oncoming wave.

Raised quarter-deck type with engines aft.—This type of ship, being designed to present a long stretch of hatches to loading appliances, also presents a large open space to oncoming seas, and it is possible for heavy seas shipped forward to travel the full length of the ship, flooding the alleyways and striking each hatch in turn * * *. Owing to the heavy weights aft, these ships trim well by the stern in ballast condition, less ballast capacity being necessary to immerse the propellor. For this reason they are difficult to handle in bad weather, and roll heavily in this condition.

LUMBER- OR TIMBER-CARRYING VESSELS

Vessels built for regular employment in the Scandinavian and other European lumber- or timber-carrying trades are generally given a broad beam in relation to draft in order to compensate for the high center of gravity caused by the carriage of large deck loads. A high center of gravity, such as is found in vessels carrying a deck

[4] Burrill, L. C. Seaworthiness of Collier Types. A paper read before the British Institution of Naval Architects. March 1931.

load of lumber, tends to make the ship unstable and this tendency is counteracted to a considerable degree by providing a broader than usual beam. Many ships of this class are given a pronounced sheer forward to prevent the seas from sweeping along the deck and tearing loose the deck load. To accommodate a large underdeck load, vessels built for these trades generally have holds that are as free as possible of obstructions such as hold pillars and web frames.

Large ballast tanks without watertight subdivisions are likely to be a source of danger in ships that spend a large proportion of their time in the timber-carrying trade. A vessel with such tanks must either keep them full to prevent the water moving from side to side and possibly capsizing the ship, or must keep them empty, in which event the stability of the vessel may be impaired when carrying a deck load. If the tanks are full, the ship's carrying capacity is likely to be reduced. Because of these facts, modern ships designed for the European timber trades have their principal water ballast tanks carefully subdivided—an additional expense at the time of building, but one which is well worth while with regard to service.

Another point that must be taken into consideration in connection with these ships is that they are subject to severe wringing strains when rolling in a heavy sea which strikes them at an angle. The deck weight of the load in the after part of the ship, which has a natural tendency to continue its roll when a sea striking the bow has checked it forward, often causes a motion which results in cracked plates and brackets just forward of the engine room in ships which have not been specially strengthened at this point. Many timber-carrying ships are consequently strengthened at the vulnerable points at the time of building.

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CHAPTER IV

PRINCIPLES OF STOWAGE

Stowage is generally understood to mean the placing and securing of cargo in the hold of a vessel, although the term "stowage" is also used in a broader sense to describe the complete operation of transferring cargo from the pier or other place of loading to the hold. It is truly an art and can be learned by the stevedore, the steamship company executive, or the ship's officer only through long experience in the handling of many types of commodities and shipping containers.

OBJECTIVES OF GOOD STOWAGE

The principal objectives which those responsible for the stowage of cargo must aim to carry out are (1) stowage to protect the ship and crew from damage or injury; (2) stowage to protect the cargo from damage, tainting, or other injury; (3) stowage to make the best use of the cargo space so the vessel will carry the maximum load of weight and measurement cargo and obtain the maximum possible freight revenue; (4) the handling of the stowage operation with the maximum possible speed in order to save time and reduce stevedoring costs by keeping overtime to a minimum; and (5) stowage arranged so that cargo for different ports can be promptly and readily unloaded upon arrival.

Stowage for safety to the ship, the crew, and the cargo, and stowage to make the best use of the ship's capacity by careful distribution of weight and measurement cargo are discussed in detail in separate chapters of this volume. The achievement of maximum port speed and the conduct of the stowage operations to place cargo for different ports so that it can be unloaded without delay upon arrival are also considered in the chapter entitled "Receipt and Handling of Cargo at the Ocean Terminal." All these subjects are also of necessity touched on in the present chapter which deals with the general problems confronting the ship's officers, stevedores, or others in charge of stowing a ship's cargo, and with the specific methods of stowage which have been found suitable for commodities packed in the more commonly used types of shipping containers.

FACTORS THAT COMPLICATE PLANNING OF STOWAGE

The stowage of a well-designed modern ocean-going vessel provided with good-sized hatch openings and relatively clear holds is in many respects a simpler matter than was the stowage of earlier vessels the hatches of which were narrow and the holds were obstructed by numerous stanchions, hold pillars, web frames, and other parts of the ship's structure.

There are still, however, almost innumerable problems to be dealt with in the stowage of any ship, despite the more efficient construction of the modern vessel. Stowage nowadays is frequently complicated, for example, by the fact that many vessels load cargo at a number of ports—such as those of the North Atlantic range or the United States west coast—for discharge at a number of foreign ports. Obviously, this makes it more difficult to place all the cargo so that it will be immediately available when the port of discharge is reached.

Take, as an example, a ship loading at New York, Philadelphia, Newport News, and Savannah, for Brisbane, Sydney, Melbourne, and Adelaide. Normally the cargo for Adelaide, the last port of call, would be placed in or near the bottom of the ship. However, if there is considerable Adelaide cargo to be loaded at Savannah, it may perforce have to be placed on top of cargo previously taken aboard for Brisbane, Sydney, and Melbourne. The difficulty cannot be solved by reserving a special hold for the Adelaide cargo, because it would take too long to discharge it through one hatch and because the weight in this hold might strain the vessel after the cargo for previous ports had been discharged.

EVEN DISTRIBUTION FOR QUICK DISPATCH

A general rule that should be followed, unless circumstances absolutely prevent it, is to stow the cargo so that there is a fair or even distribution for each port over the different holds of the ship. For example, if there are 500 tons of cargo for a certain port to be loaded into a vessel having five holds, approximately 100 tons should be placed in each hold; not 20 tons in one hold, 250 tons in another, and so on. This not only helps in some measure to make the cargo for the various ports accessible at the proper time—since the cargo for the last port of discharge is placed in or near the bottom and the cargo for the first port of discharge on or near the top—but it also helps to speed up the discharge of cargo at each port, since all hatches can be worked at the same time. Even distribution is essential for quick dispatch.

Exception may properly be taken to the above rule when it is known that cargo will have to be loaded as well as discharged at the foreign port in question. Thus, if it is known that 100 or more tons of cargo will have to be taken on board at a certain port, the outward cargo for that port might be distributed evenly among three or four holds, leaving one or two holds (or 'tween-deck spaces) into which cargo can be loaded at the same time that the outward cargo is being discharged.

It should always be borne in mind that good stowage, in connection with cargo to be discharged at more than one port requires that when the cargo for the first port has been unloaded, the cargo for the remaining ports will still be well and safely secured for the ensuing sea passage. At the same time, the vessel must be kept in trim, and free from strains caused by unequal distribution of weights. This again emphasizes the necessity for distributing the cargo for the various ports more or less evenly between the different holds and 'tween-deck spaces of the ship.

Another difficulty that frequently arises to make stowage more difficult is the fact that goods are sometimes shipped as "optional

cargo." This means that the shipper or the consignee has the option as to which port such goods are to be delivered, and the option is usually declared, say, 24 hours before the arrival of the vessel. It is obvious that the carriage of such cargo adds materially to the difficulty of planning the stowage, for it must be stowed so as to be accessible at any of the ports of discharge at which the vessel is to call.

Ideal stowage is also frequently rendered impossible or impracticable, since a ship is, in many instances, already loading before the cargo has been completely booked. To save expense and demurrage on lighters and railroad cars, the cargo on hand must be taken on board as soon as the ship is ready. Later cargo may or may not be of such a nature or consigned to such ports as to make it thoroughly suitable for stowage in or near the tops of the holds or in other spaces that may be available.

Difficulties of this nature are, of course, commonplace and constitute an accepted part of the daily routine of any busy shipping man. Nothing is to be gained by dwelling upon them unduly; but their existence must be taken into account in any consideration of the practical aspect of stowing ships' cargoes.

PREPARING THE HOLDS

Usually, the first step that must be taken in the actual process of stowing a general or bulk cargo is the preparation of the cargo holds. In some cases this may consist of nothing more than removing the loose and broken dunnage and debris remaining from the previous voyage. It is generally necessary, however, to dunnage the floors of the holds. This operation and the use of dunnage in general, as a part of the process of stowing general cargo, is discussed in the following section which deals specifically with the use of dunnage.

If the ship has carried cargo such as road asphalt, tar, or creosote, and is to load cargo that might be damaged or tainted by the odors left behind, the holds must be scoured and cleaned with special care. Usually, when a cargo consisting of such goods as flour or seeds, which are particularly susceptible to moisture damage, is to be carried, it is necessary to cover the metal beams and hold stanchions with paper, burlap, or matting to prevent the drops of moisture that may condense on the metal from contacting the cargo. Many steamship companies are now using paper for this purpose and are finding it satisfactory.

An illustration is that of a vessel which discharged a cargo of sulfate of ammonia and was then prepared for loading bulk wheat. To prepare the holds the master had them whitewashed. Upon discharging the wheat it was found that the entire cargo had been tainted by ammonia gas developed by the chemical action of ammonia and lime in the whitewash. It is generally recommended that the holds should be very thoroughly washed out with water, so as to remove all trace of the cargo, after sulfate of ammonia has been carried.

When bag cargo such as grain, coffee, sugar, cocoa, nuts, and rice, is to be loaded, a common practice is to lay separation cloths under the cargo on the floor of the hold to collect the sweepings, or cargo that leaks out of the bags, and to insure the sweepings being clean when collected after discharge.

Special hold preparation is necessary when making a vessel ready to load certain commodities in bulk. Before stowing bulk grain it is necessary to construct and erect shifting boards, or temporary wooden bulkheads, to divide the various holds of the ship into small compartments. The ship's sides, bilges, and wells are then covered with burlap. It is also necessary to build "feeders" in the hatchways or in the 'tween decks. These are large wooden hoppers into which bulk grain is placed and from which it can work down into the lower holds as the cargo settles during the voyage. Regulations for the construction and use of shifting boards and feeders are given in the section on grain, in the chapter, Stowage of Special Cargoes.

Especially heavy dunnaging is required when preparing a vessel's holds for the carriage of rice from India, Burma, Thailand, or Indochina, and the requirements for these cargoes are described in the section on rice, in the chapter, Stowage of Special Cargoes.

STOWAGE OF A TYPICAL CARGO

Probably the simplest and best way to make clear the factors that must be considered by the individual in charge of stowage is to describe the actual stowing of a ship of average size with a typical cargo of United States export products. (Fig. 37.) The example given is based, to a large extent, on one cited by Annin.[1]

Assume the ship to be an oil-burner with five holds and a total deadweight capacity of 7,300 tons. From this must be deducted, say, 1,000 tons for fuel (for the round trip), 200 tons for fresh water, and 100 tons for ship's stores. This will leave a cargo capacity of 6,000 tons weight and, say, 330,000 cubic feet bale measurement. Ten percent must be deducted from the measurement for loss in stowage, leaving a net space of 297,000 cubic feet.

The cargo booked for the vessel is, let it be assumed, as follows:

Commodity:	*Tons*	*Cubic feet*
Steel billets	1,000	12,000
Machinery	800	56,000
Oil, in barrels	500	30,000
Salt meat	1,500	75,000
Bale leather	200	24,000
Turpentine	200	12,000
Oil cake	800	28,000
Sugar	500	25,000
Automobiles	100	15,000
Condensed milk	100	5,000
General	300	15,000
Total	6,000	297,000

Ordinarily, after the holds have been dunnaged, a considerable part of the steel billets would be the first cargo to be loaded. They are heavy and it is customary to stow them in bottom space. Too much weight must not be put in the bottom, however, since a very low center of gravity would give the ship a tendency to roll, which might easily prove dangerous. Of the 1,000 tons, 700 tons would probably be put in the lower holds, 150 tons in the 'tween decks of No. 2 and No. 4 holds, and the remaining 150 tons would be held out for trimming.

[1] Op. cit.

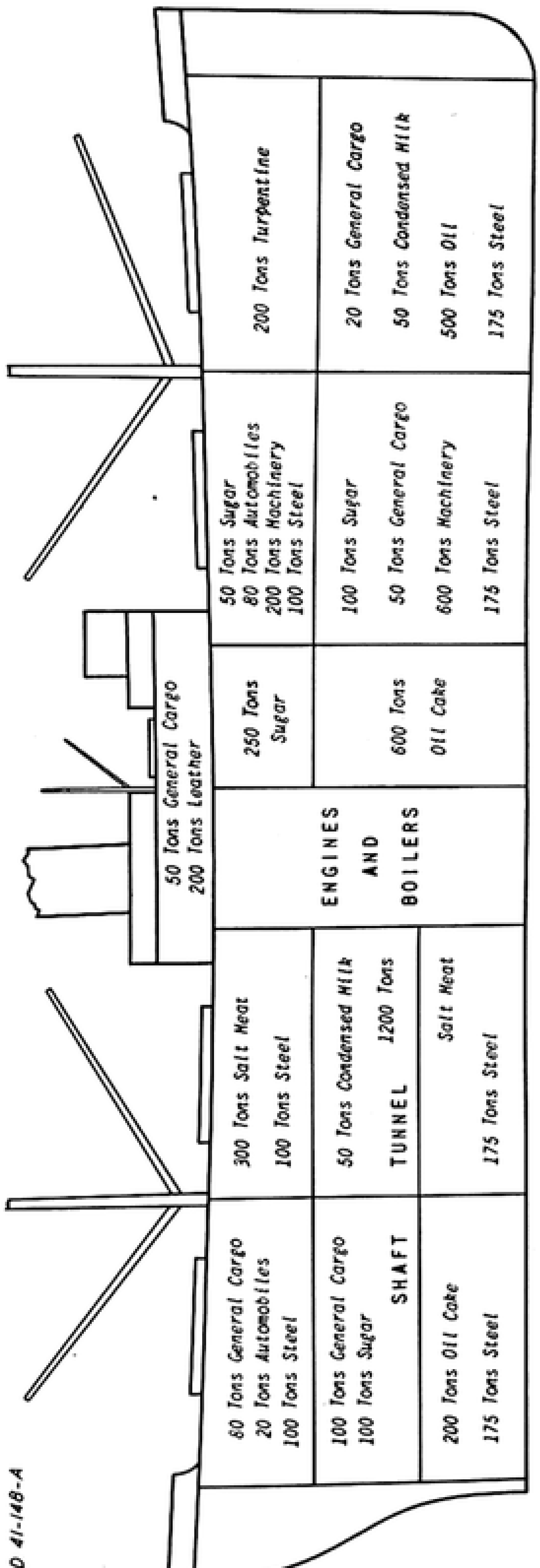

Figure 37.—Stowage plan of typical cargo.

Now the real problem begins. The salt meat, sugar, and oil cake cannot be put in the same hold as the turpentine, because the fumes of the latter would render them unfit for use. No oil, turpentine, or salt meat can be stowed in No. 3 hold, because it is directly forward of the ship's engine room and therefore too hot for these commodities. (In this connection it may be noted that in the new ships, constructed by the United States Maritime Commission, the No. 3 hold is situated forward of the amidship deck erection and very little heat from the machinery spaces is able to enter it. In the new ships, therefore, the problem posed here does not arise.) Furthermore, it is preferable not to stow the machinery in No. 4 or No. 5 holds if the cases are large and heavy, because the shaft tunnel forms an obstruction and makes quick and economical stowing difficult until the tunnel is covered with other cargo. This cargo might not bear the weight of the heavy cases of machinery.

With these limitations in mind, the stowage will in all probability be arranged about as follows: The 500 tons of barrel oil will be put in No. 1 hold and the 200 tons of turpentine in No. 1 'tween deck. If the hold is not filled, it can be topped off with small cases of general cargo or condensed milk. This is not, perhaps, the best practice. The milk itself is immune from the turpentine because it is in metal containers, but the cans and labels may be affected by the turpentine fumes. Most of the machinery will be put in the lower hold of No. 2 and will be topped off with sugar or small cases; while the rest of the machinery, most of the automobiles, and some of the sugar will go in the 'tween decks of No. 2 hold.

No. 3 hold and 'tween deck will take the greater part of the oil cake and the sugar, and No. 4 hold and 'tween deck can be used for the salt meat and condensed milk exclusively. The rest of the oil cake, sugar, and general cargo will be put in No. 5 hold and 'tween deck, and the remainder of the automobiles in the 'tween deck. The leather, being light, is ideal for the bridge deck, which it would nearly fill; and space remaining would be taken care of by what was left of the general cargo.

FINAL TRIMMING OF CARGO

It will be noted that the cargo stowed aft in No. 4 and No. 5 holds is a little heavier than that stowed forward. This is for two reasons: First, the space forward is almost invariably greater than that aft, because of the presence of the shaft tunnel in the after holds; and second, because many oil-burning vessels have a tendency to go by the head as the fuel is used. Most captains, moreover, like to sail with a "drag" of a few inches, that is, with the ship drawing slightly more aft than forward. The average ship is more manageable when in this condition, partly because the propellor is deeper in the water.

To ensure getting the proper trim, the stevedore usually holds out a couple of hundred tons of heavy cargo until the last day or two, when he stows it forward or aft, as required. The greater the distance from the "tipping center" of the ship, the greater will be the effect; so the hatches used for trimming are the ones at the ends of the ship. A ship that has its engines aft usually needs a drag of a couple of feet, since it ordinarily carries its fuel aft and, as it is consumed, the ship has a natural tendency to go by the head.

IMPOSSIBLE SITUATIONS IN STOWAGE

The cargo described above may be used to illustrate a point that is sometimes difficult for those who have had no actual dock experience to grasp, namely, that certain cargoes may prove impossible to handle under certain conditions.

Assume, for example, that the cargo booked for the vessel described consisted of salt meat, barreled oil, and turpentine, alone. As will be remembered, none of these three commodities can be stowed in No. 3 hold in the type of vessel referred to because of the heat that comes into this hold from the vessel's engine room. There being no cargo suitable for No. 3 hold, the other four holds could not be filled, since, if this were done, the ship would be subjected to very severe strains caused by unequal distribution of weight. Under such circumstances, the loading of the ship would have to be held up until cargo could be found suitable for stowage in No. 3 hold.

A situation of this kind would not arise, of course, if the vessel had a deep tank in lower No. 3 hold, which could be filled with water ballast, and it is probably safe to say that the majority of vessels of the type referred to are nowadays fitted with such a deep tank. There are always exceptions, however, and nowhere do they seem to occur more frequently than in connection with ships and shipping.

Another instance may be cited, typical of many which occur continually to harass those in charge of the loading and stowage of ocean-going vessels, and to upset their carefully laid plans. Assume that, as above, it had been planned to stow the 200 tons of leather in the bridge deck, but that at the last moment 200 tons of boxed automobiles were substituted for the leather. Boxed automobiles could be comfortably and safely stowed in the bridge deck, but this proves to be impossible because the cases are too large to be lowered through the No. 3 hatch which gives access to the bridge deck. In many older ships, this is the smallest of the hatches. Under these circumstances, the ship would have to be held up pending the booking and delivery of other cargo, or would have to sail with the bridge deck empty. It may be pointed out that this situation could not arise in connection with the new vessels constructed by the United States Maritime Commission, since they have large No. 3 holds situated forward of the amidship deck erection, and fitted with good-sized hatch openings, larger than those serving the No. 3 hold in the older type of vessel.

EXAMPLES OF BAD STOWAGE OF HEAVY CARGO

The following examples of improper stowage were considered of sufficient importance and of such frequent occurrence as to warrant inclusion in the 1939 edition of Lloyd's Calendar.[2]

A case has occurred of a ship loading a cargo consisting mainly of maize, but including 500 tons of oil cakes. There was ample space for stowing the oil cakes in the 'tween decks, and it would not have affected the vessel's stability, but the Captain stowed them on top of the maize in two holds, with a separation of timber and cloths. On discharge at Danish ports the maize was found to be considerably heated, and this was due to the weight of the oil cakes and to the fact that the separation cloths and the oil cakes themselves prevented normal ventilation of the surface of the maize.

In another case a consignment of bran in bags from the River Plate was seriously heated and compressed through cased meat being stowed on top.

[2] Lloyd's Calendar. 1939. Printed and published by Lloyd's, London, England.

Masters are warned of the possible effects of stowing heavy cargo on top of susceptible cargo, such as grain or offal.

SHORT-LANDING AND OVERCARRIAGE

Short-landing of cargo, or the nondelivery of all the goods consigned to a certain port, is a frequent result of improper stowage of a general cargo destined for more than one port. The other most frequent result is the overcarriage of cargo, which means that cargo consigned to one of the earlier ports of call is overlooked or difficult to locate and, as a consequence, is carried on and discovered only when the vessel arrives at one of the subsequent ports on its schedule.

Both of these occurrences cause expense to the steamship company and dissatisfaction on the part of consignees and shippers, and every effort should therefore be made by the company official or ship's officer in charge of stowage to see that short-landing and overcarriage are kept to a minimum.

One rule that is applied by many steamship companies, at all times when it is practicable to do so, is: When loading cargo for more than one port, load and stow cargo for only one port at a time into any one particular hatch. If this is done, the possibility of cargo for two or more ports becoming mixed is very greatly minimized.

PORT MARKS

The application of bold, easily distinguishable port marks by the steamship company's dock force is another device which is frequently employed to prevent the short-landing or overcarriage of cargo. Various types of port marks that have been successfully used are described in the chapter, Receipt and Handling of Cargo at the Ocean Terminal. The subject is again referred to here because the use of port marks is an invaluable aid in carrying out one of the fundamental principles of good stowage; namely, to stow cargo consigned to a number of ports so that it will be readily available and easily discoverable at the proper time and place.

SEPARATING CARGO TO PREVENT OVERCARRIAGE

In addition to using port marks to prevent overcarriage of cargo, some steamship companies separate cargo destined for different ports but stowed in the same cargo space. One of the most satisfactory materials for making such separations has been found to be stout kraft paper. This is obtainable in large rolls, and the lengths needed for making the separations can easily be torn or cut off as they are needed. The paper furnishes some degree of protection against dust, dirt, and moisture. Also, strong paper will, to a large extent, prevent odors from passing from one lot of cargo to another. An experienced marine superintendent has reported that, in his experience, flour stowed over pine lumber and separated from the latter by mats and dunnage will frequently become tainted. If the two commodities are separated by strong kraft paper, however, the flour does not become tainted.

Mixture of cargo which is particularly troublesome occurs with such goods as steel and iron rods, bars, and pipes, structural steel, and barbed wire; also lumber, shooks, staves, and similar goods. The latter class of cargo is often used for dunnage or filling broken stowage, and

every effort should be made to put different lots in different cargo spaces or at opposite ends of a cargo space. To separate different consignments of steel and iron goods, a useful method is to lay lengths of old wire or strands of old wire rope on top of each lot, carrying these right across the ship and securing the ends to the spar ceiling at the sides. Old rope also may be used.

UTILIZATION OF CARGO SPACE

One of the important principles that should be given careful consideration when planning the stowage of a general cargo is the economical utilization of the cargo space or, in other words, planning the stowage so as to have as little waste space as possible. Steamship operators and stevedores always measure or "figure out" the ship they are going to load so they will know the weight and measurement of the cargo needed to fill it cubically and put it down to its marks—the result that is always aimed at, when sufficient cargo is available. Achievement of this result depends in large measure upon proper utilization of the cargo space and proper balance between weight and measurement cargo, all of which is discussed in the chapter dealing with "Stowage for Maximum Use of Ships Capacity." In the present section, only certain aspects of the proper utilization of cargo space are touched upon, namely, the methods employed to reduce waste space or "broken stowage," which may properly be considered as one of the principles involved in the efficient stowage of cargo.

BROKEN STOWAGE

The spaces that, under usual conditions, are unavoidably "lost" or unoccupied by cargo include (1) the space between and around packages or containers; (2) the space occupied by dunnage; (3) the space at the sides, ends, and on top of cargo; and (4) the spaces occupied by hold pillars, frames, brackets, bulkhead stiffeners. and other permanent or temporary fixtures. These waste spaces, known as "broken stowage," vary with the kind of cargo, ranging from 2 percent up to as much as 40 percent of the total cargo space. The average is, perhaps, 10 to 12 percent, and many steamship men, when handling general cargo, allow about 10 to 15 percent of the vessel's cubic capacity for this loss in stowage. In this connection, see also the section, "The Stowage Factor," prefacing the tabulated list of stowage factors.

With casks, cylindrical containers, large reels of wire or cable, and irregularly shaped packages, the loss of space is considerably higher than the average, 20 to 25 percent or more being fairly common. On the other hand, when bagged goods or regularly shaped more or less uniform containers such as those carrying canned goods or case oil are being stowed, there is a very small amount of lost space.

The shape of the hold also influences the amount of space that will be lost. In the end holds of the ship or those nearest to the bow and stern, which narrow down in conformity with the tapering lines of the ship's hull, more space will be lost than in the other holds which are more nearly rectangular in shape. Broken stowage will also usually be greater in the 'tween-deck spaces than in the roomier lower holds.

REDUCING WASTE SPACE IN STOWAGE

Much lost space, valuable to the ship from a revenue standpoint, can be eliminated through careful planning and attention to compactness of stowage. It is relatively easy to stow square or rectangular shipping containers compactly, and, furthermore, in stowing most articles that are not rectangular or square in shape it is generally possible to arrange the units in such a manner that space will be economized.

Thus, casks and barrels can be stowed "bilge and cantline" instead of "bilge and bilge." In the same manner, pipes can be nested or stowed "bell and cantline," with the bells or large ends of the pipes in the second tier projecting beyond the plain ends of the pipes in the first tier, the pipes in alternate tiers facing in opposite directions.

In the stowage of some commodities, to be sure, the most compact stowage is not always possible because of other considerations. Tubs of butter, for example, can not be placed alternately head and bottom because the butter would leak out of the tubs stowed on their heads. In such an instance, safe carriage of the cargo is a more important consideration than maximum compactness of stowage.

There are three general methods of reducing the amount of lost space in the cargo spaces: (1) Plan the stowage carefully in advance (when this is possible) so that the tiers of packages will fit the dimensions of the hold and large vacancies will not occur; (2) stow each tier or row in such a way that the broken stowage between units is reduced to its minimum; (3) fill in as many broken stowage spaces as possible with other goods.

Assume that it is planned to stow boxes measuring 24 by 24 by 36 inches in a 'tween-deck space measuring 12 feet fore and aft by 18 feet wide and 8 feet deep. How should the boxes be placed so that the maximum number can be put in the space? Disregarding all irregularities, it will be seen that by stowing all the boxes on the flats it will be possible to get 36 boxes in each tier, and four tiers, or a total of 144 boxes, with no broken stowage. If the boxes were stowed on edge the result would be the same. If they were placed on end, 54 boxes would be placed in each tier, but there would be only two tiers, or a total of 108 boxes, and there would be broken stowage of 2 feet above the upper tier. It is just as easy to stow one way as the other, but the one method will allow for 36 more boxes and the boxes will carry better.

This is a simple illustration in which it is assumed that the space is to be completely filled with packages of one size and that there are no irregularities. If all cases were as simple, it would be an easy matter to stow the vessel "on paper" in advance. But the spaces generally contain irregularities and the packages vary greatly in size, and under these conditions it becomes very difficult, sometimes impossible, to determine without trial the most economical stowage. Planning the stowage on paper in advance is advantageous, however, in many instances, while the practice of allowing the longshoremen to determine the method of arrangement of packages in a cargo space is frequently wasteful. It is noticeable even to a casual observer that there is often an enormous amount of lost space in a hold filled with boxes by longshoremen whose operations have not been properly directed.

Perhaps the greatest space economy that can be made by planning is in distributing the commodities throughout the cargo spaces according to their nature and the nature of the spaces available. There may be one hold, for example, which is particularly full of obstructions of various kinds, in which case this hold might be filled with a commodity such as grain that will flow around the obstructions, and barrels and boxes could be reserved for less irregular spaces.

BEAM FILLING AND SMALL STOWAGE

Cargo that is used to fill the spaces left unoccupied because of irregularities in size and shape of packages, the projection of frames, spaces between beams, and the like, is known as "small stowage" or "beam filling." This class of cargo is also sometimes referred to as "broken stowage.")

Steamship owners and operators frequently book certain classes of cargo at a relatively low rate of freight in order to use such goods as "small stowage." Cargo of this kind, when properly stowed, is of double value to the ship—it increases the total freight revenue for the voyage and reduces the expense for dunnage. A careful check should always be kept on the stowage of such goods. They should be used to the fullest extent possible, that is, for the purpose intended, and should not be stowed in space which can be occupied by goods of a different nature which would pay a higher rate of freight. When stevedores place "small stowage" in the open portions of the holds where it does not belong, it is said that they are "blowing the ship out"; and in many instances this practice can reduce the vessel's revenue considerably by reducing the amount of high-paying cargo that can be carried.

Binder twine, reels of barbed wire, coils of small wire, canned goods, boxed fruit, and paraffine wax are American export products that are frequently used for small stowage or beam filling. Goods recommended for this purpose by a British authority (Thomas) includes bundles of laths, picquets, shooks, staves, timber ends, dholls of coir, bones, and horns. Rough staves are good for chocking barrels, for filling spaces between round packages, or for wing filling to keep the cargo from working loose and shifting. In certain foreign trades in which the cargoes are usually of the same general character, voyage after voyage, various commodities have been found suitable to serve as small stowage and are frequently booked at a reduced freight with the understanding that they may be used for this purpose. Thus, horns, hoofs, bones, etc. are used as small stowage in cargoes loaded at River Plate ports; various kinds of seeds packed in small bags or "pockets" are used with Indian cargoes; deal ends are employed with Baltic and other timber cargoes; and railway keys with teak-wood cargoes loaded at Burma ports.

In connection with the use of small stowage, it is generally considered very inadvisable to employ such cargo to fill the spaces between the ship's side frames, since this practice interferes with the circulation of air throughout the cargo holds, and also brings the small stowage into contact with the skin of the ship where it may be damaged by condensed moisture. In most modern well-equipped ships these spaces are, of course, walled off by means of

longitudinal battens, which prevent packages from protruding into the frame spaces.

THE USE OF DUNNAGE

The proper use of dunnage is an integral and essential part of the process of stowing cargo and, because many cargo claims arise from faulty dunnaging or lack of sufficient or suitable dunnage, the general principles of good dunnaging should be understood by every officer of the ship as well as by those on the dock and by office forces of steamship companies who are concerned with the stowage of the vessels owned or operated by the company.

ARTICLES USED AS DUNNAGE

Ordinarily the term dunnage is used by American shipping men to refer chiefly to planks and pieces of wood; but a number of other articles are also commonly used as dunnage in the various world trades. The principal articles used for dunnaging purposes are the following:

Bamboo.—Loose or in bundles. If loose, the ship's officer should sign for quantity unknown. If in bundles, they should not, unless permitted by B/L, be cut open. Makes excellent dunnage for dry goods likely to heat and throw off moisture. Stow on ends at sides and bulkheads, to facilitate heated air to rise.

Battens.—Of 2 x 2-inch or 3 x 3-inch material; used largely with refrigerated cargo.

Boards.—Generally of rough pine and largely used for case oil, 'tween-deck dunnage, for laying over bulk grain as a platform for the necessary four tiers of bags to secure same; for making a platform over ores, wet goods, such as oil barrels, and jaggery, and afterwards matted to prevent the absorption of moisture by dry cargo above; also for laying on bulkheads, spar ceiling, etc.

Bones.—When clean boiled and sawn into handy lengths, bones make very useful dunnage. Shipped chiefly from the River Plate.

Bundles of Sticks.—Largely used for rice cargo. All tropical woods of this kind should be suspected, because of the possibility that they may introduce white ants into the ship and cargo, to the ravages of which there is no end.

Coconuts.—The use of coconuts either as dunnage or fillings should be avoided with goods which are likely to be damaged by the heat and sweat arising from the coconuts.

Coir—In dholls (small rolls or bundles); used extensively in the Indian trade. The greasy kind is very useful with barrels of coconut and other oil, but it should not be used with dry goods.

Cordwood.—The most useful kind for barrel stowage, if cut into appropriate lengths.

Hoofs.—Hoof tips. Shipped from the River Plate, India, and elsewhere.

Horns.—Shipped from the Plate, China, India, and elsewhere. Very useful with hide cargoes. In filling frame spaces with these, the tips of the horns should always be up, otherwise they will act as receptacles for condensed moisture. If in bags, keep intact unless otherwise permitted by B/L. As already noted, the practice of filling frame spaces with cargo or dunnaging material is not considered good, because it interferes with the circulation of air.

Laths.—Laths are used to lay between tiers of green fruit or cases of refrigerated cargo so as to assist in the circulation of air.

Rattans.—In bundles; those of superior quality are seldom, if ever, permitted to be used as dunnage. Bundles must not be broken up. Rattans absorb moisture and form air courses, and so are ideal dunnage for floor, sides, and bulkheads with cargoes which are likely to heat and sweat, such as pepper, dry rubber (though not on floors), sago, and tapioca.

Staves.—Certain classes of staves are sometimes used for dunnaging purposes. For wedging or chocking barrels into place to prevent rolling, barrel staves or cordwood are frequently inserted between the barrels wherever there is room between the barrels and the skin of the ship, and around stanchions

and ventilators, in addition to the regular bottom chocking of the barrels. When staves are used, care should be taken to avoid mixing different marks.

When different consignments of the same class of cargo to be used as dunnage are shipped, they should be stowed apart—in different compartments if possible—in order to avoid mixing and confusion in delivery.

With horns, hoofs, bones, and similar goods, mate's receipts and Bs/L often are endorsed—"Weight and quantity unknown, all on board to be delivered."

PURPOSES FOR WHICH DUNNAGE IS USED

Dunnage is used for the following purposes, which vary in accordance with the cargo that is being carried: (1) To prevent the movement of cargo and chafage, by chocking off and securing containers and by filling in broken stowage or spaces which cannot be filled by cargo; (2) to protect cargo from contact with water overflowing from the bilges or double-bottom tanks, and from leakage from other cargo; (3) to protect cargo from contact with moisture or sweat which condenses on the ship's sides, frames, and bulkheads, and flows down to the cement caps, from where it finds its way into the bilges; (4) to protect cargo from contact with condensed moisture, which is collected and retained on side stringers, bulkhead brackets, etc.; and (5) to provide air courses for heated, moisture-laden air to travel to the sides and bulkheads along which it can rise toward the uptakes, etc.

PRINCIPLES GOVERNING THE USE OF DUNNAGE

It is not possible to lay down hard and fast rules which will apply to the dunnaging of all cargoes, all ships, or all voyages; but there are certain principles which, if borne in mind, should be of assistane to those who are responsible for the dunnaging and stowing of cargoes. Every steamship company executive or employee concerned with stowage should, for example, bear in mind the fact that the onus is generally on the ship to provide sufficient and suitable dunnage to prevent damage to cargo. The dunnage must be sufficient and suitable, not only to stand up and serve its purpose under ordinary conditions, but, insofar as possible, provisions must be made for any untoward eventualities or circumstances that may occur during the voyage. No precaution is too great to take, for example, to prevent heavy packages from crashing against other cargo or against the frames and plates of the ship.

In this connection, Bridger and Watts [3] state:

> The great difficulty is to decide what is "sufficient and suitable" dunnage. Many cases have occurred where claims have been made for damaged cargo due to the insufficiency of dunnage, or to improper dunnage having been used, and in which the verdicts of the courts, either with juries or without, appear most inconsistent.
>
> For example, it has been ruled that the permanent dunnage or wood ceiling laid on the battens on the tank tops is sufficient. In other cases it has been ruled that this is not sufficient dunnage. The same thing applies to the cargo battens on a vessel's side; some authorities say it is necessary to have vertical

[3] Bridger, H. H., and Watts, O. M. The Stowage of Cargo. Imray, Laurie, Norie & Wilson, Ltd., London. 1927.

dunnage alongside these permanent battens; again, others say it is unnecessary. Therefore it remains for those concerned to exercise the greatest forethought in considering this matter of dunnage.

As an example: suppose a vessel loaded with a bag cargo has permanent wooden cargo battens, and has dunnage laid on the 'tween deck and under the cargo. Now should this vessel through accident or bad weather get water into the hold, if the dunnage was not sufficient to allow the water to run clear of the cargo to the bilges, the ship would in all probability be held responsible for the damage to the cargo on the grounds that it was caused by "insufficient dunnage."

The provision of sufficient dunnage to protect the cargo being carried is therefore of the first importance. It is of equal importance, however, to have suitable and proper dunnage. Not infrequently cargo is damaged by the dunnage itself. This should be guarded against by seeing to it that all wood, matting, or other materials used for dunnaging are perfectly dry. If dunnage containing a good deal of moisture is placed in the hold of a vessel, evaporation will take place when the hold becomes heated, and moisture damage to the cargo may result. Also, care should be taken to see that there is no harmful oil, grease, or dirt on the dunnage. Dunnage which has been in contact with creosoted goods, aniline oils, essential oils, or similar odorous goods should never, under any circumstances, be used a second time. Many claims have arisen in the past because of damage by tainting caused by the use of such dunnage.

General rules for the use of dunnage may be summarized as follows:

(1) Dunnage may be laid fore and aft or thwartships, and spaces must be left to allow water to run to the strum boxes.[4] It is advisable to increase the thickness of the dunnage in the wings. A few laths laid fore and aft under the thwartship dunnage in the wings will ensure free flow of any water.

(2) It is important that all water condensing on the sides of the ship runs into the bilges. To ensure this taking place, put pieces of dunnage across the limber boards up to a point just above the filling boards in the rounding part of the hold.

(3) Stringer or wing plates in the 'tween decks, also cement caps, should be adequately dunnaged because of possible moisture damage, even though the deck does not require dunnaging.

(4) Similarly, all other ironwork such as stanchions, deep and web frames, coamings, shaft tunnel casings, etc., should be well covered. The shaft tunnel is not usually covered except at the square of the hatch. The remainder of the tunnel may be protected by means of upright battens at the sides and by tarpaulins over the rounded top part.

(5) Special care should be taken in the 'tween decks to see that dunnage of sufficient thickness is laid in the wings to allow the condensation running down the ship's sides to have a clear run to the scuppers.

(6) Ships built with double bottoms and no bilges require that special care and attention be paid to dunnaging the floors to make certain that water which may run down the sides of the ship has a free passage to the well.

STOWAGE OF VARIOUS TYPES OF GOODS AND CONTAINERS

The physical operation of stowing cargo in the hold of the ship, which is performed by longshoremen trained in this particular work, is one that calls for great skill and experience. Every effort must be made to stow the different types of goods, packed in numerous

[4] In the majority of vessels now in service the scuppers leading from the holds and 'tween decks to the bilges are at the sides of the ship. In these ships the bottom dunnage is laid athwartship to permit water, leakage, etc., to flow unimpeded to the sides. In many of the recently constructed vessels, however, particularly in the American merchant marine, the scuppers are placed at one end of the cargo space, namely the end that is lowest owing to the sheer of the vessel. In these ships the bottom dunnage should accordingly be laid fore and aft.

different kinds of containers, so that the hold space will be utilized to maximum advantage and to insure the goods against damage from breaking, chafing, crushing, moisture, shifting of cargo, and other hazards.

The planning of the stowage so that certain goods are not placed in close proximity to other cargo which might contaminate or damage them by taint, or in an unsuitable location such as near the engine or boiler room where they might be damaged by heat, is a problem chiefly to be solved by the steamship company or stevedoring executive who lays out the ship and prepares the stowage plan. The actual stowage and dunnaging of the goods is, of course, done by the longshoremen of the stevedoring organization employed, and much depends upon their experience and training.

It has been stated by British authorities [5] that:

> We are convinced that "bad stowage" is responsible for more damage to cargo than is generally realized, and we will go so far as to say that much damage which has been attributed to "perils of the Sea" has been really caused or contributed to by "bad or incorrect stowage."

Methods of stowing goods packed in certain kinds of containers commonly used in international commerce are described below. Although these descriptions represent the views of experienced shipping men, circumstances may at any time alter cases, and the method employed at one time may not always be found possible or suitable at another. In making use of this information, therefore, it must be remembered that exceptional circumstances may frequently arise, and stowage must then be arranged in accordance with such circumstances.

BAGGED CARGO

A large number of commodities are packed for ocean shipment in bags, such as sugar, coffee, grain, flour, cement, and rice. The method used for stowing bags varies according to several factors, including the size and quality of the bags; the nature and condition of the contents, and the requirements of the particular commodity as regards ventilation. The stowage of the more important types of bagged cargo is referred to under the name of the commodity in the section, "Commodities and Their Stowage." There are certain basic principles of stowage, however, which apply to practically all bagged goods.

Many commodities carried in bags are likely to be damaged if stowed close to moist cargo or cargo that may sweat. Care must be taken, therefore, not to place such bagged cargo alongside other goods which might damage it by means of moisture.

In the actual stowing, great care must be taken to dunnage bagged cargo thoroughly and to protect the bags absolutely against direct contact with ironwork. Special care should be taken at the turn of the bilge, brackets, and cement caps, all places where moisture is likely to be in evidence. Mats or other protective material should be used to provide protection against moisture running down the bulkheads, hold pillars, frames, etc. (fig. 38).

Bags should not be allowed to overlap beams, stringer plates, or other similar obstructions in the hold. If this is done, the working

[5] Bridger, H. H., and Watts, O. M. The Stowage of Cargo. Imray, Laurie, Norie & Wilson, Ltd., London. 1927.

of the vessel is likely to cause the bags to be cut. A common practice is to cover the floor of the hold with separation cloths, which assists in gathering up the sweepings from unavoidably damaged bags.

Bleeding of grain bags to permit more cargo to be stowed should not be permitted. Loose grain may fill the frame spaces where it

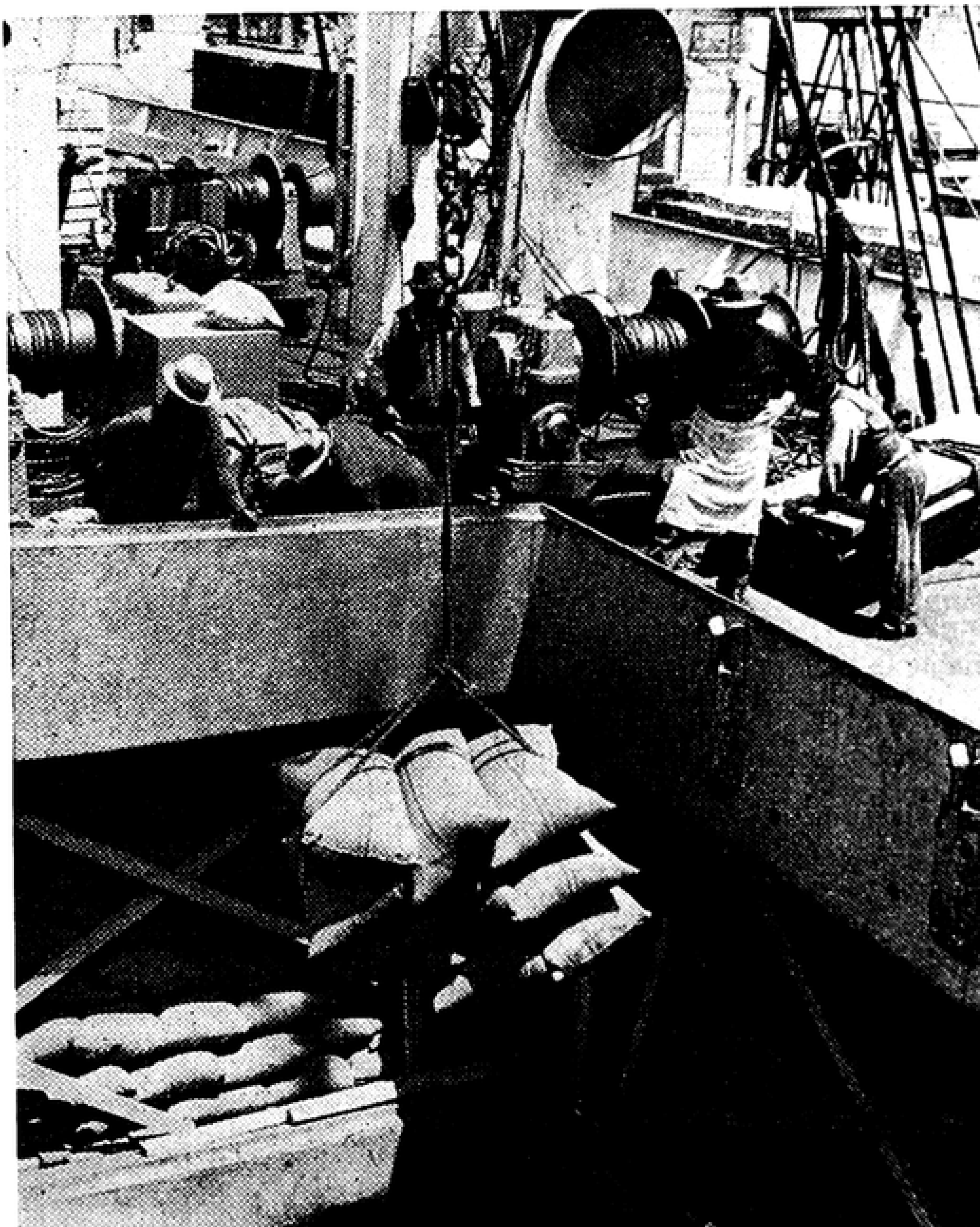

Figure 38.—Stowage of bagged cargo. Chilean lentils being stowed in 'tween decks at Valparaiso.

will be damaged by sweat and may interfere with the ventilation at the side of the ship. Furthermore, bags which have been bled are likely to be removed from the ship and cause a shortage of bags on delivery, the contents of the missing bags being regarded as sweepings from torn bags.

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When one class of bagged cargo is stowed on top of another class, such as flour on top of grain, it is essential that the two shipments be separated by means of cloths or mats to prevent loss of contents from torn bags and to prevent mixing with the cargo below. The same precaution should be taken when bagged cargo is stowed on top of other dry cargo.

Bagged cargo in large lots is usually stowed in tiers fore and aft right across the hold.

Stowage is started at the transverse bulkheads and proceeds from them toward the center of the compartment, the work being done

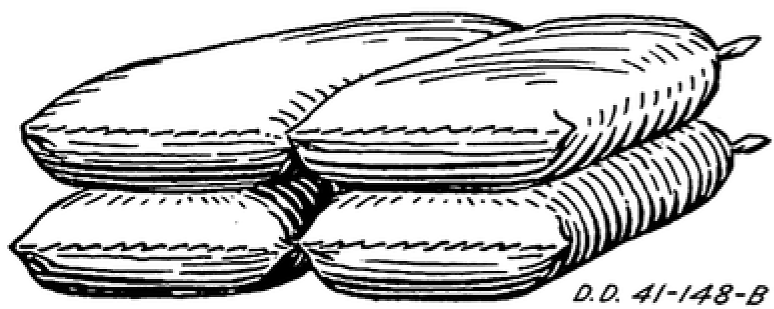

Figure 39.—Bag stowage for commodities requiring all possible ventilation.

row by row athwartship. When a ship is close dunnaged or matted at the sides, it is good practice to stow the bags in the wings athwartship, since this leaves only the end of the bag close to the ship's side and, if sweat runs down the side, only the end of the bag is liable to damage.

When bagged cargo is loaded in a vessel which is using only the customary wooden cargo battens for dunnage, it is good practice to stow the bags in the wings on end. This prevents the centers of the

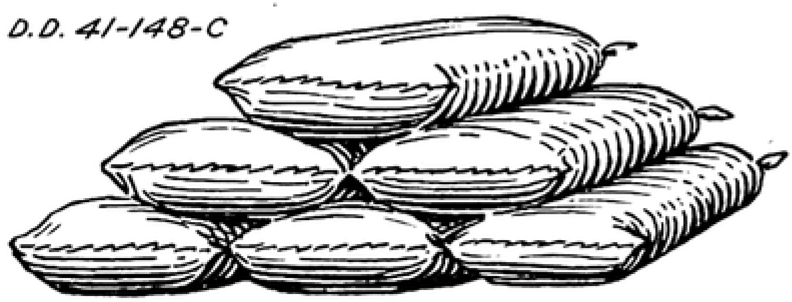

Figure 40.—Bag stowage—"half-bag" method.

bags from protruding between the cargo battens and possibly contacting the moist metal of the frames or shell plating.

The method of tiering depends largely upon the commodity being carried. If the commodity is one for which all possible ventilation is required, the bags should be stowed one on top of another, with the ends well butted (fig. 39). If thorough ventilation is not of importance, however, and if the bags are soft, better stowage will be achieved by stowing "half bag," as shown in figure 40. Stowage in this case is advantageously done tier by tier. The cubic space occupied by a ton is a little less, and this method may sometimes gain as much as one tier underneath the beams.

When stowing blocks of bags, particularly for a run between loading ports when all space is not filled, it is advisable to "cross tie" or lock the corner bags to prevent the block from collapsing, or lay several bags crossed in the outer rows and upper tiers, so that the outside bags are jammed against one another and solidly is insured.

The use of cargo hooks should not be tolerated in connection with the handling of bagged goods. It has been said that the only way to prevent this is to have the foreman collect all cargo hooks; and this suggestion is worthy of consideration if a steamship company finds that bagged cargo carried on its ships is being consistently damaged by hooks.

It is also a very practical plan, and one that is commonly practiced. to have a needleman on hand to sew up torn or open bags delivered to the ship. This simple precaution has doubtless saved many thousands of dollars worth of goods which otherwise would have been lost or damaged.

Mixed cargoes of bagged goods of varying weights, such as wheat, barley, flour, rapeseed, and other oil seeds, are frequently loaded at Karachi and Bombay. It is not always the best practice, taking the stability of the vessel into consideration, to stow the heavier bags in the bottom of the ship and the lighter bags and bale goods above. A system of stowing, sometimes called the "sandwich" method, has often proved advantageous for these cargoes. In this system, tiers of lighter bagged goods are put in between tiers of heavier goods such as bagged wheat. A ship will as a rule carry a better cargo if this method of stowage is used.

BARRELS, CASKS, HOGSHEADS, AND OTHER CONTAINERS

An understanding of the construction features of a barrel or similar container indicates the precautions that must be taken in stowing these containers in a vessel's hold. The strongest part of a barrel is at the quarter hoops, and the weakest part at the center of the bilge. Accordingly, the quarters should carry the weight of the tier above. The bilge should never bear the weight of the barrel itself or of the tier above. Barrels should be stowed "bilge free."

A second point is that, in a properly constructed barrel, the wooden sections of the head are placed so they are vertical when the bung is on top. As a consequence, the barrel is better able to withstand pressure from above when in this position, and a second requirement for proper stowage is that barrels should be stowed "bung up."

The most important operation in the stowage of barrels is the arrangement of the bottom tier. Stowage should be commenced at one end of the center-line of the hold, the barrels being stowed fore and aft in an athwartship row. Such a row is called a "longer."

The bilge of each barrel should be kept free of the floor of the hold by means of suitable beds, usually made of soft wood, placed beneath the two quarters, so that the bilge does not support the cargo stowed on top. The size of beds varies with the size of the barrel, but for ordinary barrels beds measuring 12 to 14 inches long and made of 2- by 2-inch material, are usually considered satisfactory. Quoins or chocks should be driven in under the quarters of each barrel to prevent it from moving sideways. In some instances the

quoin is wedge-shaped, as the name implies; at other times pieces of ordinary cordwood are used as chocks.

The heads of the second athwartship row should be butted exactly on to those of the first row, so that chime of one barrel lies fair with the chime of the one next to it. (The chime of a barrel is the circle formed by the ends of the staves.) If the chimes are out of line and interlock with one another, it is possible that the heads might be broken, particularly when the barrels are being broken out for discharge. The head of a barrel is its weakest part and must be carefully protected.

Care must be taken to make the fore and aft rows perfectly straight. The outer rows should not follow the lines of the vessel's hull. With straight parallel rows, the cantlines are kept straight for the stowage

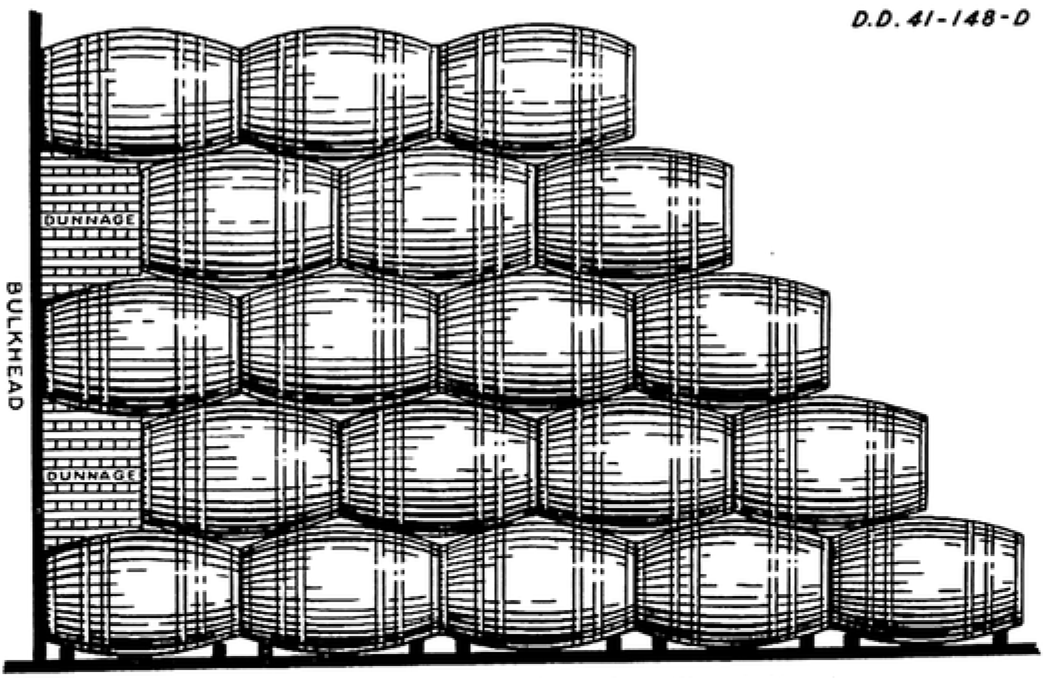

Figure 41.—Barrels stowed bilge and cantline—half cask.

of the tier above. The empty spaces in the wings are to be filled with dunnage.

When stowage has reached the wings, the wing barrel should not be forced in so that it is higher than the other barrels in the same tier. The space between the wing barrel and the side of the ship must be well filled with dunnage, tightly packed in. If there is any slackness at this point, which will permit the wing barrel to move, the whole of the stowage may be weakened and there is a possibility of serious damage.

The succeeding tiers are stowed "bilge and cantline" (see fig. 41). This method economizes space, puts the pressure on the quarters of the barrels, and there is less likelihood of damage if heavy weather is encountered. When this stowage is used, the second tier is commonly started "half cask" away from the bulkhead and the intervening space is filled up with dunnage wood so the barrels in the third tier will rest partly on the bed formed by the dunnage wood and partly on two barrels in the tier below. Each barrel of the second

athwartship row will rest on four barrels of the tier below, a great advantage in distributing weight.

Tier after tier is laid in this way until all the barrel cargo is stowed, or until the height becomes so great that there is danger of crushing the lower tier. The determination of the height of tiering rests primarily on the stevedore's judgment of the strength of the barrels. The following are the usually accepted allowable heights for strongly made barrels:

Three or four tiers of pipes.
Four tiers of puncheons.
Six tiers of hogsheads.
Six or seven tiers of tierces of beef and pork.
Seven tiers of barreled oil, etc.
Eight tiers of barreled flour.

There is some difference of opinion regarding the necessity of adhering strictly to the above heights; but they have been commonly used as a guide for many years. Bridger and Watts[6] maintain, for example, that conditions have so altered in recent years as regard

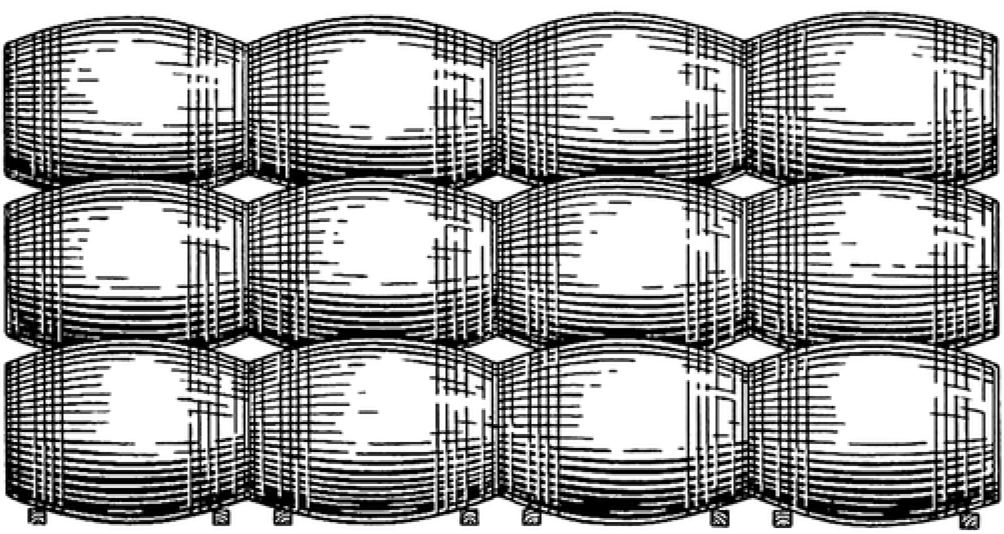

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Figure 42.—Barrels stowed bilge and cantline—whole cask.

vessel size and construction and construction of barrels, that it may be possible nowadays to stow six heights of pipes and deliver them in better order than was formerly possible with, say, five heights of barrels.

Barrels may be stowed "bilge and cantline," in what is sometimes called the "whole cask" method, shown in figures 42 and 43. This does not distribute the weight as well as the "half cask" method previously described. The method is not generally recommended except for empty barrels.

In the after hold with the shaft tunnel, consider the spaces on both sides of the tunnel as separate holds, observing that it is necessary to build up the tiers of barrels so that they will key into each other above the tunnel.

There is considerable difference of opinion as to the advisability of "skidding" or "flooring off" a barrel cargo after several tiers have been laid. By "flooring off" or "skidding" is meant the laying of

[6] Op. cit., p. —.

a platform or floor over a complete tier of barrels. Some authorities hold that the laying of such a floor results in pressure on the bilges of the barrels in the tier immediately beneath it, whereas if there is no flooring, each barrel will rest, as pointed out above, on four barrels beneath it.

In some cases, when there is only a single tier of barrels, and no cargo to go on top of them is expected, they are stowed on their ends. This method should be used only in special circumstances, since it is nearly always possible that heavy cargo may later be booked which would have to be stowed on top of the barrels.

If barrels containing different commodities are stowed together, or if barrels are stowed in a hold with other goods, care must be

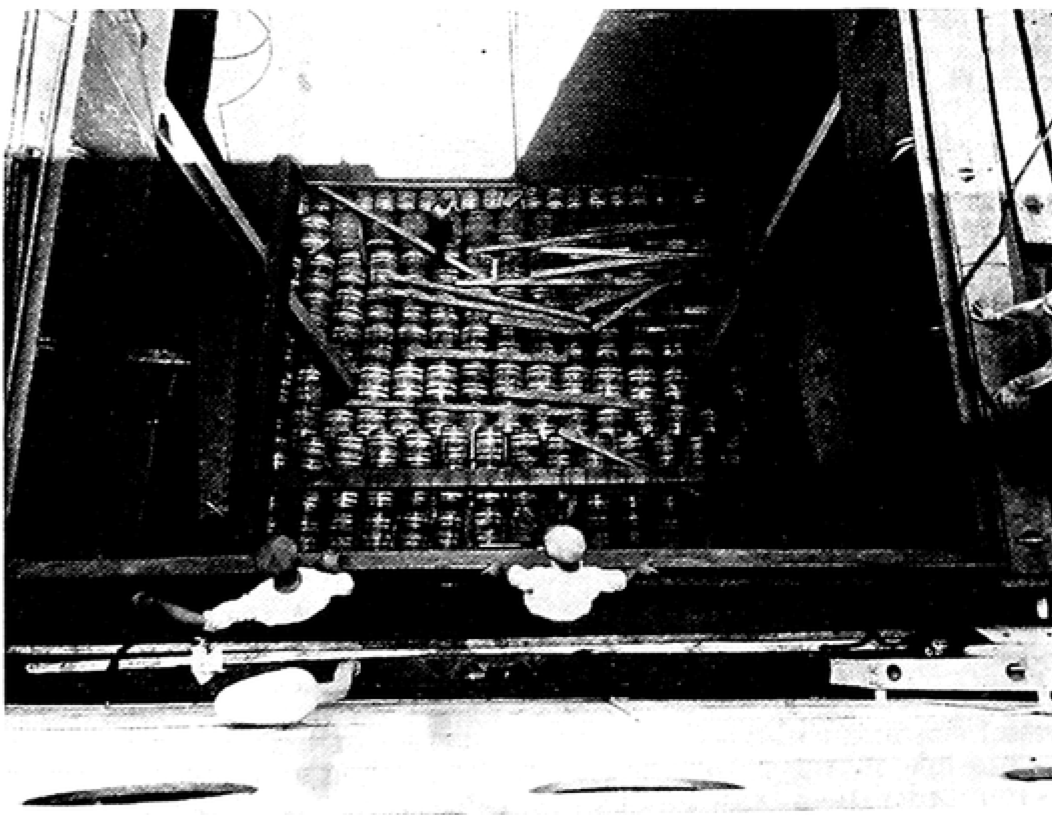

Figure 43.—Showing actual stowage of barrels in the lower hold.

exercised to avoid damage by leakage. It is customary to place barrels containing liquids at the bottom of the hold or on some heavy commodity that will not be damaged by their contents in case of leakage. They should never be placed on top of fine goods. Oil barrels should not be stowed over barrels of molasses, nor should barrels containing liquids be stowed over barrels containing dry materials. Barrels likely to start their staves by heat must be stowed away from the engine room or other sources of heat. Barrels with contents that emit a disagreeable odor must be kept away from foodstuffs, and barrels containing delicate wines must be protected from odorous goods.

When barrels are being loaded or discharged in large quantities, coopers should be kept at the pier to repair barrels that are damaged.

There are certain exceptions to the general stowage principles outlined above. For example, slack barrels containing glassware are commonly stowed vertically on their ends and carry safely in this position. Care must be taken, however, to see that they are on a level foundation, and strong dunnage boards must be placed between each tier. Only light cargo should be stowed on top of such barrels, and, when this is done, the top tier of barrels should be well boarded over.

Empty barrels should be carefully examined before being accepted for shipment to determine the nature of their previous contents. Many such barrels have been used for the carriage of inflammable materials and not infrequently still contain dangerous gases. Empty barrels intended to carry liquids should not be stowed near the engine or boiler room or exposed to heat on long voyages, since the heat tends to dry up the staves and render the barrels unfit for containing liquids.

METAL DRUMS

Metal drums are extensively used today for the shipment of many liquids and a number of dry products. They are usually stowed on end with dunnage on every tier.

The Board of Underwriters of New York has inserted in several of its regulations rules as to the height to which drums containing certain commodities may be stowed. These rules are as follows:

> Any inflammable liquid with a flash point between 20° F. and 80° F. may be carried in the I. C. C. No. 5E drum (55-gallon capacity) provided the drums are new. The drums must not be stowed more than six high on end. If the full quantity in height is not required, no cargo must be stowed on top of the drums whose weight would exceed that of the drums and contents. The drums must be well dunnaged between each tier and any broken wing stowage must be filled in with dunnage to equalize the pressure on the lower tiers and make a level. No drums with inflammable liquid are to be used as fillers between the beams under the deck head.
>
> Gasoline, naphtha, and benzine may be carried in 18-gage, 55-gallon steel drums (straight sided or corrugated) providing the drums are new and direct from the oil works or factory. The drums must not be stowed more than seven high on end and if the full quantity in height is not required there must not be stowed on top of the drums any cargo whose weight would exceed that of the drums and contents.

BALED GOODS

A large number of different manufactured materials are packed in burlap or other bales for ocean shipment, including cotton piece goods, fine textile goods, certain classes of paper, burlap, felt, and numerous other commodities. Raw materials, such as cotton and wool, are also baled, and leather and some other products are made up in bale form without any outer covering.

Baled cargo is especially liable to damage from chafing and from moisture. To prevent chafing, bales should be carefully dunnaged and blocked off to prevent movement of the cargo. Flat board dunnage should be used underneath bales, as any kind having sharp edges, such as battens, would be likely to cut through the bale wrappings. For fine goods, the dunnage boards should be covered with mats or some similar material.

All metal parts in the hold should be well dunnaged to prevent damage from moisture.

Bales are stowed on their flats, with their lengths fore and aft or athwartship. The bales at the sides of the hold, however, are frequently stowed on end. Then, if there is condensed moisture on the sides of the ship, or chafing against the sides, the flats or sides of the bales will be affected, not the ends, where damage in the case of piece goods, etc., would affect the entire contents. For the last tier under the head beams, the usual practice is to stow them on their sides, or even on end when this way saves space.

Bales are frequently stained by oil left on the deck or ceiling or by leakage from other cargo stowed above them. Every effort should, of course, be made to prevent this type of damage.

If boxed goods are to be stowed over bales, particularly if the boxes are of light construction, a good flooring should be laid on the bales. If thin dunnage wood is used, it will give, especially if the bales are soft, and the cargo above will be displaced and possibly damaged.

No hooks should be used on baled goods of any kind. There are altogether too many damage claims resulting from the use of hooks.

Loss of space can frequently be avoided when stowing a large consignment of bales of the same size, by carefully measuring the head room as the tiers approach the top of the hold or 'tween deck. Often it is possible to have the top tier finish close underneath the deck above by putting one or two tiers on their edges or even on their ends.

CASES AND CARTONS

In a general cargo of miscellaneous goods there is usually a varied assortment of wooden boxes and cases and fiberboard cartons of numerous sizes, weights, and types of construction. Proper stowage of these mixed packages obviously requires careful planning, skillful placing, and good dunnaging (fig. 44).

In most instances, the strongest and heaviest cases are stowed in the bottom of the lower hold. With large cases, such as those containing automobiles and heavy machinery, great care must be exercised to stow them perfectly level so the weight will be evenly distributed and no stresses will be set up which might wreck the cases when the vessel is laboring in a seaway.

Every effort should be made, as the stowage proceeds, to keep a level tier. This is achieved principally by filling up the empty spaces between large boxes with small boxes. When boxes of light construction are being stowed, they should be boarded over before commencing the next tier. This will not only protect the smaller, lighter packages, but will make for better stowage of the cargo as a whole.

When stowing the upper tiers, no box should be placed so that it rests inside the edges of the top of the box beneath it, unless dunnage boards are placed across the top of the lower box to take the weight.

In stowing boxes, particularly a number which are of the same dimensions, it is good practice to arrange the tiers as bricks are laid in a wall. That is, each box should rest on two boxes beneath it.

Boxes containing commodities that may leak should be stowed separately or at the bottom of the hold. Boxes containing commodities requiring ventilation should be placed in the upper parts of the compartments.

When stowing a large number of light wooden boxes, such as those used for canned foods and dried fruits, the working tier should always be protected by laying down walking boards.

Each tier of boxes of a similar size and shape should be kept perfectly level all the way across the hold. In many ships the ceiling rises a little as it approaches the turn of the bilge, and boxes stowed on this rise will be at an angle. This should be avoided at all costs. If boxes are stowed at an angle in this manner, the next tier above will put extra pressure on the tilted edge of the lower end or wing boxes and damage will almost inevitably result. The wing boxes should be omitted and the space filled with dunnage wood. Boards

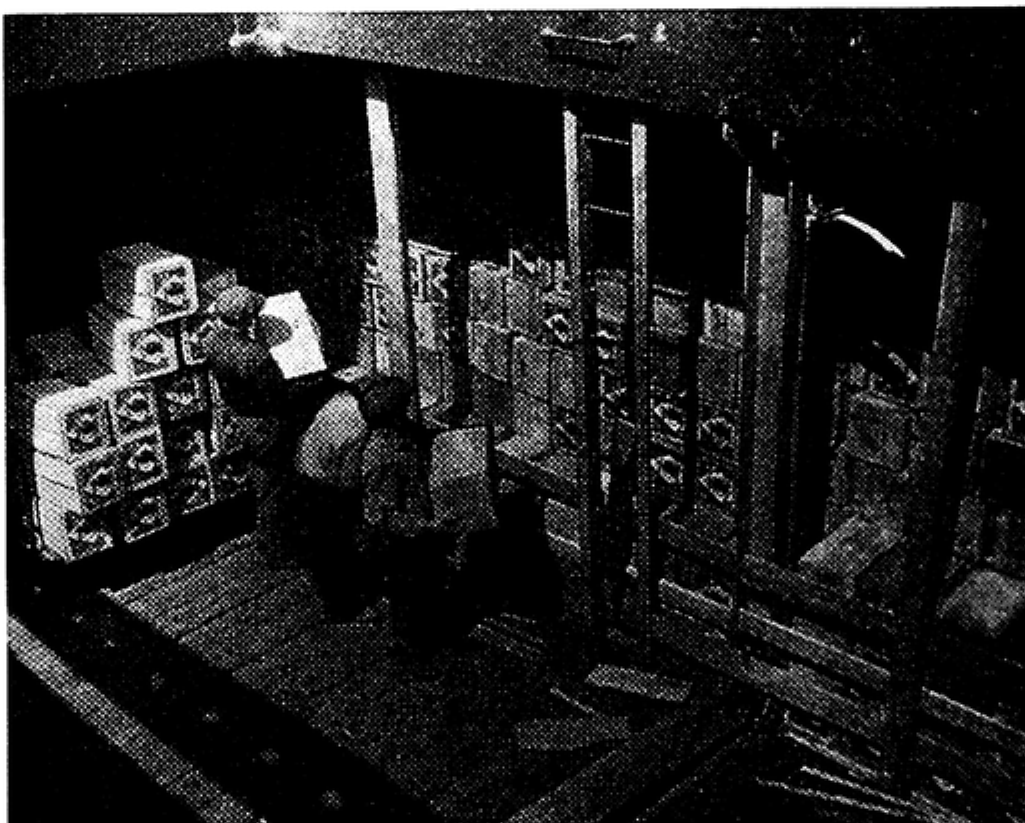

Figure 44.—Stowing wooden boxes in the 'tween decks.

should then be placed on the lowest and subsequent tiers extending out to the sides of the ship.

Lightly made wooden boxes and fiberboard cartons obviously require the most careful attention, since no heavy weights should be placed on top of them.

Cargo hooks on plywood boxes.—Cargo hooks should not be used in handling plywood boxes. These are sturdy containers of value to many shippers as they combine great strength with light weight. They are frequently used for products of relatively high value, such as electric refrigerators, radio cabinets, and high-grade textiles, and there have been many cases of serious damage to this class of goods, resulting from cargo hooks being driven through the sides of the plywood containers.

CARBOYS AND DEMIJOHNS

Carboys are glass containers commonly packed either in a wooden protective casing or in a wicker or iron basket filled with cushioning material. Carboys are frequently shipped completely boxed in, with the neck protected by a special wooden covering, and this packing is to be very much recommended.

Carboys are principally used for the carriage of liquid chemicals, including dangerous acids. In the latter case, stowage on deck is usually required for safety. On deck, carboys should be stowed on planks in a sheltered position, but always accessible so that any carboy that breaks can be seen and thrown overboard. Carboys should be lashed in place and, if carrying acids, wire rope is preferable, since acids will frequently burn through ordinary manila rope. (See also section on deck cargoes.)

When carboys contain liquids that are not dangerous and are stowed underdeck, it is preferable to stow them in one of the 'tween decks and against a bulkhead. There is less danger of breakage if they are kept away from the center of a space full of other cargo. If more than one height is to be stowed, boards should be laid over the lower tier of carboys on each side of their protruding necks, and the bottoms of the carboys in the second tier should rest on these boards. In this way they will be between the necks of the carboys in the lower tier.

Demijohns are similar to carboys, but are smaller, usually holding from 1 to 5 gallons. Frequently, demijohns are entirely surrounded by woven wickerwork which extends right up to the neck. They are generally held out until the last and are stowed on top of other cargo, frequently being used as beam filling. If there are two tiers, the bottoms of the upper tier rest between the necks of the demijohns in the lower tier, no dunnage being needed in between.

CYLINDERS

Cylinders are strong steel containers, chiefly used for the transportation of gases, such as ammonia and oxygen, under pressure. They are generally carried on deck and may be stowed fore and aft on planks laid athwartship to keep the flange, which projects beyond the body of some cylinders at one end, free from contact with the deck.

The second tier should be stowed in the cantlines of the lower tier and in the reverse direction, with the cylinders stepped back a little so the flanges will project beyond the bottom ends of the cylinders in the lower tier. In no case should cylinders be stowed "bilge and bilge" or directly on top of one another.

After tiering, the cylinders should be securely chocked and lashed in place (see fig. 45).

DECK CARGOES

Some commodities are customarily, and others are occasionally, carried on deck, generally at the risk of the shipper. When stowing a large amount of cargo on deck, care must be taken not to block off bitts and fairleads, the sounding pipes to the bilges and ballast tanks, the handles of the valves controlling the opening of watertight bulkheads or of piping systems, or any other pieces of equipment essential to the operation or safety of the vessel. The steering gear and chains

should be carefully protected. A good practice is to outline with chalk the spaces that are to be kept clear. Usually, the speed with which cargo is handled and the difficulty of continually supervising the stevedores makes this precaution extremely advisable.

The types of goods that are commonly carried on deck may be classified as follows:

Dangerous goods, which it would be unsafe to carry underdeck.

Articles which, because of their nature, size, or shape, cannot readily be stowed underdeck, e. g., locomotives, large unboxed airplanes, and motorboats (figs. 46 and 47).

Material, such as lumber, cork, esparto grass, and fibers, which is frequently carried on deck as well as underdeck because the ship is full underdeck but is not down to its marks.

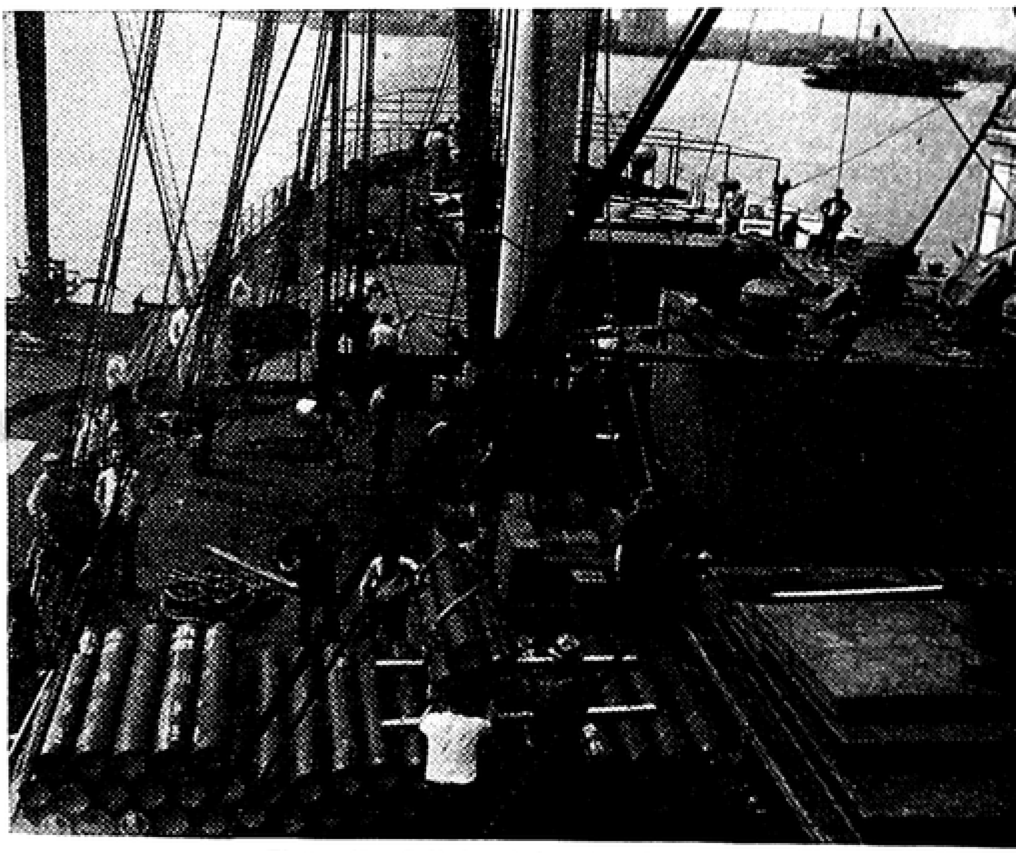

Figure 45.—Cylinders being stowed on deck.

Miscellaneous cargo for which there is no space underdeck, owing to the ship being full, and which is considered suitable for on-deck stowage.

Dangerous goods include such commodities as corrosive acids, highly inflammable substances, and other materials which might damage the vessel and other cargo if stowed underdeck. Articles of this description that must be carried on deck are listed in "Regulations Governing the Transportation, Storage, and Stowage of Explosive or Other Dangerous Articles on Board Vessels," issued by the Bureau of Marine Inspection and Navigation.

The method of packing used determines to some extent the manner in which such goods are stowed on deck. Carboys, for example, should be stowed in a sheltered position and should be well-bedded and securely lashed in place. Metal drums containing liquids which

must be stowed on deck should be placed on end on boards or planks. They are frequently stowed in a corner of the deck or around a mast, and are secured with planks around which wire or chain lashings are placed. Drums may also be stowed along the bulwarks, with a large

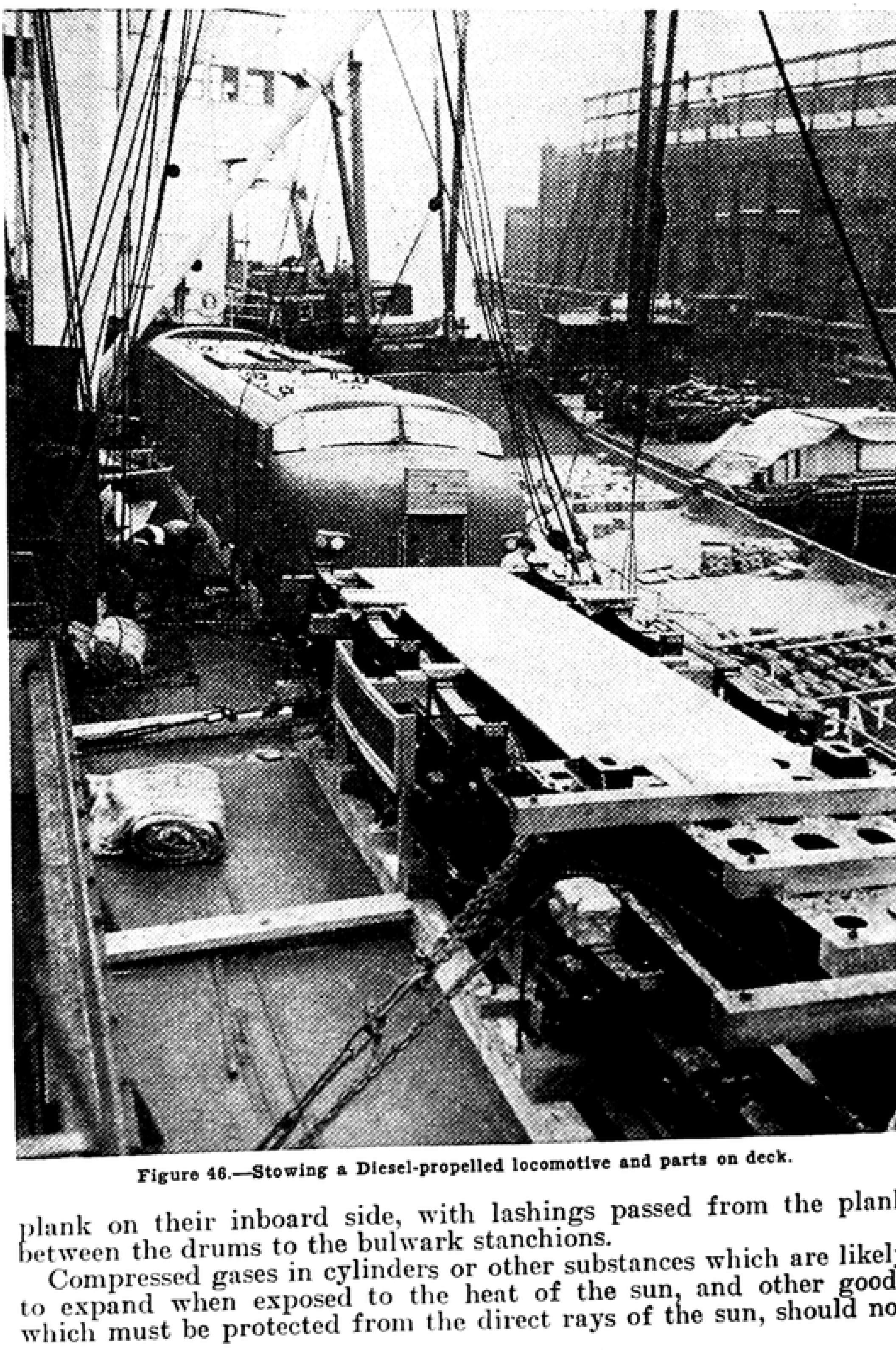

Figure 46.—Stowing a Diesel-propelled locomotive and parts on deck.

plank on their inboard side, with lashings passed from the plank between the drums to the bulwark stanchions.

Compressed gases in cylinders or other substances which are likely to expand when exposed to the heat of the sun, and other goods which must be protected from the direct rays of the sun, should not

be covered with black or dark-colored tarpaulins or other covers, since these retain and intensify the sun's heat.

Packages of dangerous goods to be carried on deck should not be too large or heavy to prevent their being readily moved if it should be necessary to jettison them to protect the ship and crew.

No general rules can be laid down to cover stowage of articles which are carried on deck because of their nature, size, or shape, since proper stowage is governed by these very features, and differs in accordance with them.

One principal aim must be to secure such cargo effectively so it will not break adrift during heavy weather. (See figs. 46 and 47.) In many cases this requires the preparation of a proper bed constructed of stout timber.

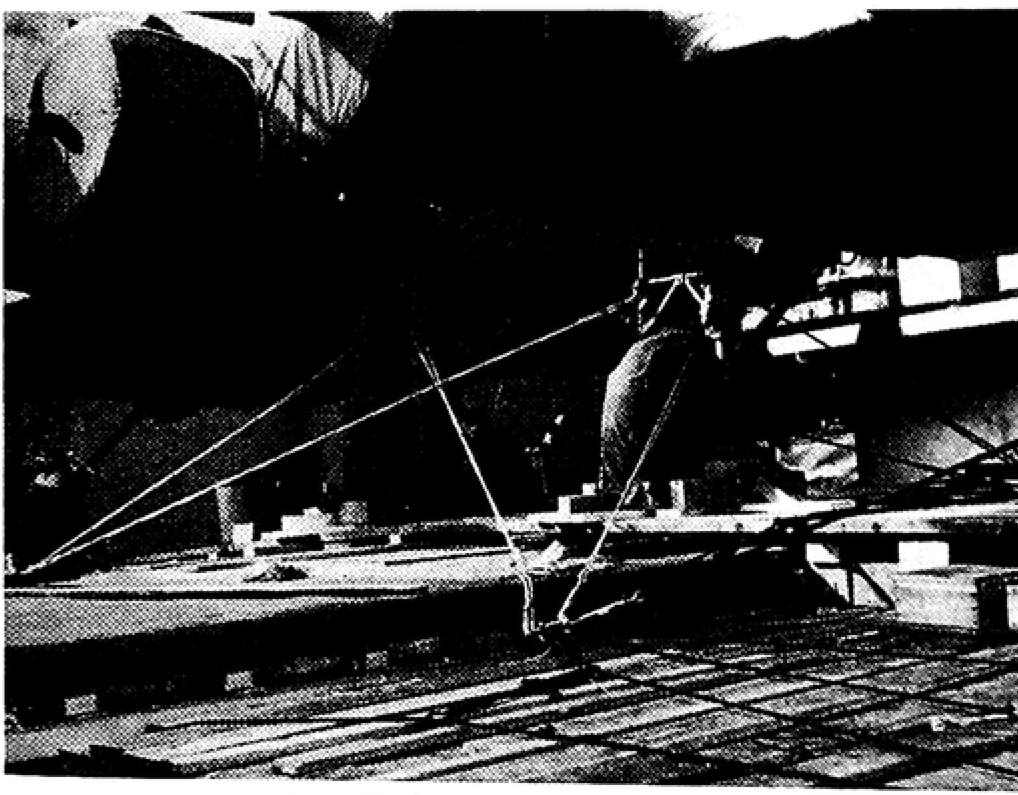

Figure 47.—Securing an airplane on deck.

It is of importance in many ships, when heavy weights are to be carried on deck, to place them on a portion of the deck that is strong enough to support the weight. Such goods are frequently placed so that they are over a bulkhead below. In some cases, when heavy castings, forgings, etc., are being carried, the decks are given additional support by means of wooden shores placed under and over beams and wedged up hard with fine wedges to hold them securely in place.

It is recommended that dunnage boards beneath heavy cargo extending for some distance over the deck should be laid diagonally, at an angle of about 45 degrees, to protect against buckling of the deck plates.

Another important point, sometimes overlooked, is the absolute necessity of providing sufficient fastenings for the lashings securing

heavy cargo. Not infrequently a number of turns of wire, rope, or chain are taken around a piece of deck cargo and secured to a single small ringbolt, which may possibly not be able to bear the extra strain during heavy weather. If sufficient fastenings are not available, it is a simple matter and one that should not be neglected, to fit extra ringbolts where required. Ringbolts for this purpose can easily be bolted to the ship's bulwarks or deck and can be removed when no longer needed.

It should be noted that there are certain ships specially equipped for the carriage of exceptionally heavy and bulky cargo. Shippers of such material frequently find it advisable to use these special vessels, whose facilities are designed expressly to cope with the problems of loading and stowing heavy objects, such as locomotives, large and heavy condensers, and boilers.

Lumber deck cargoes are of great importance and in all instances require careful consideration to ensure the stability of the vessel at time of sailing and at subsequent stages of the voyage after considerable quantities of fuel and water have been consumed. Owing to the many special points to be considered, the carriage of lumber deck loads is treated separately in the section on lumber, in the chapter, Stowage of Special Cargoes.

When more cargo is booked for a vessel than can be carried underdeck and it is necessary to stow some cargo suitable for the purpose on deck, such cargo will necessarily be at the ship's risk and should be covered by insurance.

PACKING TO REDUCE CUBIC MEASUREMENT

Progressive exporters are well aware of the importance of shrinking or reducing the size of their export packages. This is done because many articles pay ocean freight on the basis of cubic measurement and, consequently, the smaller the package the lower will be the ocean-freight charges. Those who are entering the export field for the first time should bear this in mind, since careful packing in this respect may save them many hundreds of dollars during the course of a year. Reduction of cubic measurement not only will result in reducing freight charges, but will mean saving in freight-car space, in storage space, in handling costs, and in many cases in the cost of the container.

An export package may be reduced in size by the more compact packing of the contents, the disassembly or knocking down of the article being shipped, the redesigning of the container, or the redesigning of the article being shipped, either to make it smaller in size or to permit its disassembly. It would be difficult to state whether greater savings have been made by redesigning the package or by changing the disposition of the contents in the package, but it is probable that in almost every case something of the two principles enter into every satisfactory export package.

One of the most common errors in packing is the failure to utilize the waste spaces in the container which are created by the character or form of the contents. This frequently can be rectified by using a smaller case or by packing additional items. For example, rubber-tire manufacturers pack cartons of tubes inside a bundle of tires. Both methods result in more compact packing.

Waste of space is frequently occasioned by using containers which do not fit the contents, and this commonly results from the practice of trying to make a one-sized case do for a number of commodities. A manufacturer who believes he is saving money by using the same sized case for all his line can easily determine whether or not this is so by calculating the freight paid on the extra cubic measurement of a few shipments and comparing the total with the saving that results from the use of a one-size container.

More compact packing can sometimes be achieved by nesting articles that are of suitable shape. This is done with bathtubs, cooking utensils, and many other manufactured articles. Compression may also be used. A shipper of pork products packs hams under very high pressure and thus puts a considerably greater number in a box of the size previously used for a smaller number. Compression is also used in baling clothing and other textile goods, also leather, paper stock, cotton waste, etc. The problem differs with each commodity, but every exporter should study his individual product or products to see if more compact packing and consequent reduction of the size of the container or the inclusion of more articles is possible.

Disassembly of articles to be shipped has resulted in the saving of thousands of dollars in ocean-freight charges for many companies. One motortruck manufacturer, for example, advises that by shipping certain trucks completely knocked down, the cubic measurement of the container is reduced from 238 to 192 cubic feet, showing a saving of 46 cubic feet. Metal office furniture and wooden and metal household furniture may also be successfully disassembled. Legs may be removed from tables, chairs, and beds, and metal office files of certain types can be almost completely taken apart and shipped in much smaller space than if completely set up.

Redesigning of export containers has been one of the most outstanding methods used to reduce cubic measurement of export packages. For example, cleats may be put on the inside instead of the outside where the contents are of an irregular shape and there are open spaces which make room for the cleats, and this is also true of battens that are placed around the middle of cases. The cubic measurement of wooden boxes and crates may also be reduced by using a hardwood with good strength properties instead of a softwood, since the former permits the use of a thinner wood. One company reports saving from 3 to 4 cubic feet per crate, as a result of changing from the use of pine wood to oak. Another company, using a box with ⅞-inch sides and ¾-inch ends found, through consultation with a packing engineer, that ⅝-inch sides and ½-inch ends supplied entirely adequate protection, provided the right kind of lumber was used, the right type and number of nails were employed, and the nails were correctly placed and driven. The consequent reduction in the cubic of the company's shipments meant a very substantial saving during the course of a year. A well-known tractor manufacturer, by using a stout plywood box instead of the previous nailed wooden case, has reduced cubic measurement per shipment from 103 to 73 cubic feet. These examples are just a few of the many that might be cited.

Some shippers have been able to reduce the cubic measurement of their export shipments to a very marked degree by using bales instead of wooden or fiberboard containers. It has been estimated that with suitable articles the average saving in space resulting from packing in machine-pressed bales instead of nailed wooden boxes is around 30 percent. The experience of the War Department during the World War showed that a great variety of textile materials can be baled, including underwear, hosiery, sweaters, gloves, coats, trousers, towels, blankets, tarpaulins, tents, bedding, cloth, and many other articles. It was even found possible to bale successfully officers' high-grade uniforms without injury from the compression, by carefully folding and tying the garment along the proper lines. Numerous other articles are shipped to foreign countries in bales, including such diverse items as bags, broomcorn, belting, carpets, emery paper, excelsior, feathers, felt, flax, fodder, furs, hair, hemp, hides, hops, leather, leaves, mattresses, moss, pipe couplings, paper, sorghum, springs, steel turnings, straw, tin cans, tobacco, veneer, waste paper, wire, wood pulp, wool, and yarn.

Redesigning the product itself has been resorted to by many companies to reduce the cubic measurement of their export packages. Projecting parts may be eliminated or be made detachable, or an article may be made of separate parts, easy to disassemble and reassemble, instead of being constructed in a single piece.

Further information on the subject of packing to reduce cubic measurement, design of export containers, strength properties of the various woods used in box making, etc., are referred to in the publication, Modern Export Packing, prepared in the Transportation Division of the Bureau of Foreign and Domestic Commerce, and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C.

CHAPTER V

STOWAGE FOR MAXIMUM USE OF SHIP'S CAPACITY

FACTORS INFLUENCING BOOKING OF GENERAL CARGO

The traffic manager and other officials who are responsible for securing general cargo for a vessel engaged in the cargo-liner trade must continually bear in mind a number of factors which have a direct and vital bearing upon the success or nonsuccess—from a profit viewpoint—of the vessel's voyage. Consideration must be given not only to individual shipments, their stowage factors, and the rates of freight they pay, but also to the relation of all the shipments to each other. A cargo must be secured, if possible, that is well balanced by weight and volume, and by the character of the commodities involved. The freight accepted should not be all deadweight or the vessel will be brought down to its marks before its holds are filled. A certain amount of small packages should be obtained to use as broken stowage. Dangerous freight must not be taken unless it is properly packed and the vessel has the required accommodations for it. Freight revenue must be continually borne in mind and this depends not only upon the quoted rates, but also upon the skillful combination of weight and measurement cargo to obtain the greatest number of "payable tons."

After studying the nature of the cargo that is available or can be secured in the existing market, the steamship official must proceed to select and adjust it according to the requirements of the vessel that is to be loaded. He must know the individual peculiarities of the ship, and make provision for such factors as the size of hatches, capacity of winches and booms, and whether the holds are clear or contain numerous pillars or stanchions. Stability and trim must also be taken into account. In some cases, the depth of beams and frames, depth of holds, height between decks, and temperature of the various compartments are also factors that may have an important bearing on the type of cargo that can be carried or is desirable to carry, and upon the stowage of the cargo accepted.

Provided that cargo is moving in such volume as to permit the steamship company to select certain kinds of goods in preference to others, the selection of cargo will be made to a large extent with a view to its freight-paying capacity. Thus, cargo of high value, large measurement, or packed in unusual shapes or sizes, will pay relatively high rates and be helpful in building up revenue. Other cargo which pays low rates or which involves extra expense or hazard, such as heavy lifts and corrosive, caustic, or otherwise dangerous or injurious goods, will be less desirable.

The factors that influence the selection of a general cargo, when such selection is possible, may be grouped under the following headings: Desirable distribution of weight and measurement cargo; the

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basis upon which freight rates are quoted; the stowage factors of the different kinds of cargo offered; and the combination of the above factors to produce the greatest number of "payable tons." These factors and their relation to stowage for the best use of the available cargo space in the ship's holds are discussed below.

DISTRIBUTION OF WEIGHT AND MEASUREMENT CARGO

Cargo of such nature that a long ton stows in less than 40 cubic feet is known as "deadweight cargo" and, in most instances, pays freight on a weight basis, as, for example, $20 per 2,240 pounds or 60 cents per 100 pounds.

Cargo of which 1 long ton occupies 40 cubic feet or more is known as "measurement cargo." Usually, unless a specific rate is quoted, it pays freight on a measurement basis, as, for example, 50 cents per cubic foot.

A "measurement ton" is 40 cubic feet. The assumption that 40 cubic feet equal 1 ton is believed to have originated in the Russian grain trade from the Black Sea, in which it was demonstrated by experience that 1 ton of Russian wheat required 40 cubic feet for stowing. Furthermore, it was apparently determined that, for early steamships, this was a fair basis of calculation. That is, these vessels were lowered to their marks when filled with cargo stowing 40 cubic feet to the long ton, or having a stowage factor of 40. Lighter cargo, which stowed at more than 40 cubic feet per ton, would fill such a vessel without lowering it to its marks. On the other hand, heavy cargo that stowed in smaller space than 40 cubic feet per ton, would put the vessel down to its marks before the cargo space was entirely filled.

Actually, vessels differ very widely in their capacity to carry weight and measurement cargo. This is owing partly to the different relationships that exist between deadweight and cubic capacity, owing to the individual type of construction. Many shelter-deck steamers, for example, can carry more measurement cargo than can three-island-type vessels of the same net tonnage. Some ships are put full and down by cargo that stows at 40 cubic feet to the ton; others, with greater relative cubic capacity, by cargo stowing at 60 cubic feet.

On the basis of 40 cubic feet being equivalent to 2,240 pounds, it can be seen that 1 cubic foot of cargo measuring 40 cubic feet to the ton would weight 56 pounds, or one-fortieth of 2,240 pounds. Since it requires fairly heavy merchandise to weigh as much as 56 pounds per cubic foot, it follows that many commodities are "measurement cargo" and pay freight on a measurement basis. They weigh less than 56 pounds per cubic foot, and 40 cubic feet will consequently weigh less than 2,240 pounds. For example, with goods weighing 50 pounds per cubic foot, 40 cubic feet (a measurement ton) will weigh only 2,000 pounds.

The fact that many commodities pay freight on a measurement basis emphasizes the desirability of packing export merchandise in packages having the smallest possible cubic measurement.

One of the principal objectives sought in selecting and stowing a general cargo is to obtain a combination of weight and measurement cargo that will fill the ship's cubic capacity and at the same time

provide sufficient weight to bring it down to its marks. In other words, to put the ship full and down. If the ship is not well filled, there is a possibility that, if severe weather is encountered, some of the cargo may shift and damage the goods or endanger the vessel. On the other hand, if the vessel is not down or nearly down to its marks, it may not handle well, the propellor being partly out of water, and losses may be suffered because of reduced speed or increased consumption of fuel. Moreover, if neither the maximum volume nor weight is carried—assuming sufficient cargo of the requisite types to be available—the vessel will not earn the maximum freight possible under the existing circumstances.

Many factors, of course, militate against the securing of the full and ideal cargo that fulfills all the requirements cited above. Combination passenger and cargo liners, advertised to operate on a rigid schedule, must usually sail at the appointed hour—even though they have not taken on board a full cargo, or even all the cargo that has been booked for them. Many cargo liners also sail on schedule even when they are not fully loaded, though, for practical reasons, there is considerable deviation from this practice, and it is usually considered in order to hold the ship until all the cargo booked has been loaded. Frequently, when trade is slow and cargo is not moving in large volume, it is not possible to secure a full, well-paying general cargo. The vessel must then take what it can get or fill out with flour or other staple goods which are nearly always available for shipment at the large seaports. At other times the problem is just the reverse. Cargo is offered in large quantities and the steamship company is obliged to shut out the surplus cargo which the vessel cannot carry. Under such circumstances, there is generally considerable opportunity to select cargo that stows well and pays a high or relatively high freight.

BUILDING UP REVENUE

Ship operators or owners must, of course, make every possible effort to obtain cargoes that will return the highest revenue per voyage. Ordinarily, little selection of cargo is possible, the ship being obliged to take whatever is offered. When cargo is moving in good volume, however, it is often possible to select cargo that returns a relatively high revenue. Consideration is given in the following pages to the matter of booking and stowing cargo to build up the highest possible revenue for the ship. First, however, there is brief discussion of certain other factors which have a bearing on this problem, namely, how the vessel is measured for cargo, stowage factors, and the different bases on which ocean freight rates are assessed.

LAYING OUT AND MEASURING THE SHIP

Consideration is given in this section to the selection of weight and measurement cargo for a particular vessel, in order to put it full and down. The related problem of choosing cargo that will return the greatest revenue is dealt with in the concluding section of the present chapter, "Stowage of a Typical Cargo."

Knowing the cubical content of the cargo space and the deadweight cargo-carrying capacity of the vessel, it is a simple matter to figure the kind of freight, as regards stowage, that will fill the

ship and put it down to its marks. Take, for example, a ship having a deadweight cargo-carrying capacity of 6,000 tons and a cubic capacity (bale) of 340,000 cubic feet. To fill such a ship and put it down to its marks, each ton of cargo should measure approximately 57 cubic feet (340,000 divided by 6,000). It is impossible, of course, to obtain cargo, all of which measures 57 cubic feet to the ton; but it is possible in many instances to secure a combination of weight and measurement cargo which will have an average measurement of 57 cubic feet, or whatever the desired measurement may be for the particular vessel.

While the cargo is being received and measured, the stevedore is measuring or "figuring out" the ship, to determine the weight and measurement of the cargo needed to fill it cubically and put it down to its marks. This is easily calculated for the total cargo by the method just explained. As the work of loading progresses, however, it is necessary to check continuously to determine how much more cargo—either weight or measurement—can be put aboard. The weight to go is figured from the draft of the ship and by reference to the ship's immersion scale. The latter is a diagram which shows the number of tons required to immerse or put down the ship 1 inch at all its various drafts. (When the ship is light, fewer tons are required to immerse it 1 inch, because of the fining down of the hull structure fore and aft.)

Assume, for example, that it is known from the immersion scale that the ship, at a certain draft, goes down 1 inch for every 42 tons loaded, and by taking the draft it is found that there is still 3 feet 5 inches to go. Then, 3 feet 5 inches equaling 41 inches, $41 \times 42 = 1{,}722$ tons; and this is the amount of cargo, by weight, that can still be put aboard. Assuming that the net space remaining in the ship is 80,000 cubic feet, it will require cargo stowing 46 feet per ton to put the ship down and fill it, since 1,722 tons of cargo stowing 46 feet per ton will occupy approximately 80,000 cubic feet of room in the hold.

THE STOWAGE FACTOR

The stowage factor of any commodity is the figure which expresses the space in cubic feet occupied by a long ton of the commodity packed for shipment. This factor is computed by dividing 2,240 pounds by the weight, in pounds, of a cubic foot of the commodity packed for shipment. For example, goods which weighs 40 pounds per cubic foot has a stowage factor of 56 (2,240 divided by 40).

Stowage factors are sometimes calculated to take into consideration an allowance for broken stowage and dunnage. The more usual American practice, however, is to compute the stowage factor as above, and allow for broken stowage, etc., by deducting, usually, 10 percent from the bale cubic capacity of the vessel being loaded. The stowage factors given in this volume for United States export products, for example, represent the actual space occupied by a long ton of the commodity packed as described, no allowance for broken stowage being included.

Stowage factors vary from such low factors as 5 for bismuth metal ingots, 7 for lead sheets, and about 9 for pig lead, to over 1,000 for unnested wicker baskets. Cork, a frequently cited light-weight com-

modity, stows from 300 to 420 cubic feet per ton, and feathers packed in sacks stow from 350 to 400 cubic feet per ton.

Commodities which have a stowage factor of less than 40 are known as "deadweight cargo"; and those with stowage factors of 40 or more are called "measurement cargo."

Stowage factors, by the nature of things, cannot be absolute indicators of the amount of cargo that will fit in a vessel's holds, since the amount of broken stowage or waste space will vary according to the shape of the holds, the number of hold pillars, and the location in which various types of goods are stowed, whether at the tapering end of a hold, for example, or in a roomy, rectangular cargo space.

Knowledge of the stowage factor, or the relative weight and measurement of each kind of cargo is indispensable in the work of planning the stowage of a ship. Such knowledge aids the traffic manager or other responsible official to select cargo (when it is moving freely) which will fill the ship properly, build up a maximum freight revenue for the voyage, and at the same time keep the vessel in good trim and with weights safely distributed.

BASES UPON WHICH FREIGHT RATES ARE QUOTED

Ocean freights are payable in a variety of ways in the different world trades. Many rates on general cargo are quoted at so much per ton, weight or measurement, ship's option. This means that the rate named will be applied either per ton of 2,240 pounds (in some trades, 2,000 pounds) or per measurement ton of 40 cubic feet—whichever will result in the higher revenue for the vessel.

An example will make clear how the application of rates quoted on this basis works out in actual practice. Assume the general cargo rate to be $20 per ton, weight or measurement, ship's option. Goods that weigh exactly 56 pounds per cubic foot will stow at 40 cubic feet (a measurement ton) to the ton of 2,240 pounds. On such goods, the question of whether the freight is to be applied on a weight or measurement basis does not arise, since the rate is the same whichever way it is applied.

Now assume a shipment of goods that weighs 50 pounds per cubic foot. This is measurement cargo. Such goods will occupy 44.8 cubic feet per ton (2,240 divided by 50, the weight of 1 cubic foot). One long ton of such goods, therefore, occupies more than a measurement ton of space (40 cubic feet). The steamship company, quoting on the basis of $20 per 40 cubic feet, will charge $22.40 for 44.8 cubic feet. If they accepted the goods on a weight basis, they would receive only $20 for the same amount of goods, namely, 1 long ton.

Another common way of quoting is to name two rates, as 45/80, which means that the cargo specified will pay 45 cents per cubic foot or 80 cents per 100 pounds, whichever basis provides the greater revenue. Such rates are designed to provide an equal or approximately equal revenue from goods which stow at 40 cubic feet per ton—the dividing line between weight and measurement cargo. Thus, in the present instance, 40 cubic feet of cargo (a measurement ton) would pay 40×45 cents, or $18. By weight, such cargo would pay 22.4×80, or $17.92.

In connection with this type of rate quotation, the following excerpts from a report recently submitted by C. O. Arthur, examiner for the United States Maritime Commission, is of interest:

By complaint filed July 12, 1939, it is alleged that defendant's rate for transportation of 117 cartons of glass lamp globes or shades from Seattle, Wash., to Ketchikan, Alaska, on bill of lading dated January 22, 1938, was unjust and unreasonable.

The shipment weighed 1,752 pounds and measured 504 cubic feet. Applicable thereto was defendant's tariff item "Freight, NOS," stating a rate per 100 pounds of 39 cents and a rate per cubic foot of 19.5 cents, subject to a rule published in the tariff providing, in part, that "where rates are stated in cents per 100 pounds and per cubic foot, charges will be computed by weight or measurement as one mode or the other will yield the greater revenue." The measurement rate of 19.5 cents per cubic foot was assessed on the shipment, and complainant paid freight charge thereon of $98.28. Complainant's position is that this rate was and is unreasonable to the extent freight charge thereat exceeds $6.83 which would have accrued at defendant's weight rate of 39 cents per 100 pounds.

Where, as in the trade concerned, rates are assessed on this alternative weight or measurement basis, it is the established practice to compute the transportation rate on the principle that a weight ton is the equivalent of 40 cubic feet. Defendant's tariff item and rule here concerned meticulously observe this practice, $7.80 being defendant's revenue per weight ton of 2,000 pounds or per measurement ton of 40 cubic feet. Although, as shown by complaint, the freight charge on glass lamp globes or shades as shipped by complainant at the measurement rate is 14.4 times a charge computed at defendant's Freight, NOS, weight rate, it is to be noted also that complainant's shipments measure 14.4 times their weight. At the weight rate contended for by complainant, defendant's revenue for transporting 40 cubic feet of glass lamp globes or shades as shipped by complainant from Seattle to Ketchikan would be a patently inadequate compensation for the service of 54.2 cents. No facts are presented in the instant case which prove the measurement rate here assailed to be unjust or unreasonable.

While the above-mentioned methods of quoting ocean-freight rates on general cargo are perhaps the most common, steamship lines in many trades quote numerous class and commodity rates which state specifically whether the rate applies per cubic foot, per 100 pounds, or per bag, package, or other unit of cargo.

The units on which rates are based are not the same in all trades. More commonly they are quoted per 100 pounds or cubic foot, per 2,240 pounds or 40 cubic feet, and per 2,000 pounds or 40 cubic feet. In some instances, however, there are special bases, as, for example, lumber per 1,000 feet board measure or 1,000 superficial feet; poles and piling, per linear foot; kerosene, per case of two 5-gallon cans; and lubricating oil, per barrel. The assessment of rates per case, barrel, or other similar unit is possible in some trades, because standard containers have been adopted by the shippers.

Still another basis of rates is a percent of the value, articles of exceptionally high value being frequently charged ad valorem rates. The carrier usually reserves the option of charging on either the weight or measurement basis, and in the case of valuables the additional option of charging on the ad valorem basis. In many cases, however, one or the other basis is specifically provided.

COMBINING WEIGHT AND MEASUREMENT CARGO FOR MAXIMUM REVENUE

Every ship has two cargo capacities—weight and measurement. In addition, every ship has a third capacity, which involves all the factors that determine the first two, plus the type of cargo avail-

able, plus the ability of those responsible for the vessel's stowage. This third capacity is called the "payable tons," and consists of the number of tons of 2,240 pounds carried at a weight rate, plus the number of tons of 40 cubic feet carried at a measurement rate, which can, by skillful stowage, be placed inside the ship. This capacity will usually vary with every voyage—sometimes widely—owing to the varying nature of the cargo available. The following cargoes, used as examples, illustrate this point.

Assume a ship having a deadweight cargo capacity of 6,000 tons and a net cubic capacity of 300,000 cubic feet (7,500 cubic or measurement tons). If this ship were to be loaded entirely with deadweight cargo, the result might be as follows:

1. *Heavy deadweight cargo.*—6,000 tons copper ingots at $30 per ton weight—$180,000.

With such a cargo, having a stowage factor of 10, only 20 percent of the ship's cubic capacity would be utilized, and 80 percent would go to waste. The entire cargo would occupy only 60,000 cubic feet.

If, on the other hand, the same ship were to load with light cargo, such as high density cotton with a stowage factor of say, 90, the result would be:

2. *Lightweight measurement cargo.*—7,500 cubic tons cotton at $30 per ton measurement—$225,000.

With this cargo the ship would be full, but nearly half its deadweight would be unused and it would not be down to its marks. The cotton, stowing 90 cubic feet per 2,240 pounds, would weigh only 3,333 tons (300,000 cubic feet divided by 90).

In neither of the above cases is the ship full and down; nor is it carrying the possible number of "payable tons."

By combining the two commodities—copper and cotton—a somewhat better result would be obtained, as follows:

3. *Weight and measurement cargo combined:*

3,000 tons copper, 30,000 cubic feet, at $30 per 2,240 pounds	$90,000
3,000 tons cotton, 270,000 cubic feet, at $30 per 40 cubic feet	202,500
Total, 6,000 tons weight, 300,000 cubic feet	292,500

With such a cargo the ship would not only be full and down, but would receive in gross revenue over 60 percent more than for cargo No. 1, and 33⅓ percent more than for cargo No. 2. Its "payable tons," instead of being 6,000 tons weight, as in cargo No. 1, or 7,500 tons measurement, as in cargo No. 2, would total as follows:

Copper (by weight)	3,000 tons, of 2,240 pounds.
Cotton (by measurement)	6,750 tons, of 40 cubic feet.
Payable tons	9,750 weight and measurement.

A cargo such as the above is not typical; indeed, it would be extremely rare to find a similar combination in actual practice. Such an extreme example, however, illustrates the principle more clearly than a longer and more typical cargo list composed of numerous miscellaneous items. The principle of increasing "payable tons" by a judicious combination of weight and measurement cargo is always a part of the general problem of securing and stowing a vessel's cargo.

Another cargo, and one which might more readily be encountered in actual practice, is given below:

4. *Miscellaneous cargo:*

1,000 tons copper (10 feet), 10,000 cubic feet at \$30 weight	\$30,000
2,000 tons oil (60 feet), 120,000 cubic feet at \$30 measurement	90,000
1,000 tons machinery (70 feet) 70,000 cubic feet at \$30 measurement	52,500
2,000 tons sugar (50 feet) 100,000 cubic feet at \$30 measurement	75,000
Total, 6,000 tons weight, 300,000 cubic feet	247,500

This cargo puts the vessel full and down with 8,250 "payable tons." The weight tons (copper) total 1,000 tons; the measurement tons of 40 cubic feet each total 7,250 (290,000 cubic feet divided by 40).

COMBINATION OF TWO TYPES OF FREIGHT

Practically all general cargoes contain both weight and measurement freight. The problem of combining two commodities—one weight and one measurement—to provide the necessary weight and volume to put the ship full and down, is relatively easy and can be worked out by a simple calculation.

Assume that the vessel has a deadweight cargo-carrying capacity of 6,000 tons and a cargo space of 360,000 cubic feet. The number of cubic feet per deadweight ton is 360,000 divided by 6,000, or 60. Assume that the measurement cargo has a stowage factor of 80, and the deadweight cargo a stowage factor of 20. Deduct from the average space per deadweight ton (60) the stowage factor of the deadweight cargo (20), and multiply the remainder (40) by the cargo tonnage of the vessel. This gives 40 times 6,000, or 240,000. Divide by the difference between the stowage factors of the two commodities, which is 60. The result (4,000) is the number of tons of measurement freight that should be carried, and the difference between this figure and the total cargo that can be carried, or 2,000, is the number of tons of deadweight cargo to be loaded.

It will be seen that the vessel, under this disposition of cargo, carries the maximum weight and volume, for the weight of the two commodities is 6,000 tons and the volume is 4,000 multiplied by 80, plus 2,000 multiplied by 20, or 360,000 cubic feet.

The formula which may be used for the above computation is as follows:

$$X=\frac{V-a\,T}{b-a}$$

in which—

X = number of tons taken of the lighter commodity or having the higher stowage factor
V = bale capacity in cubic feet
T = total number of tons of cargo that can be carried
a = stowage factor of the heavier commodity
b = stowage factor of the lighter comodity

In the illustration just given, substitution would be made as follows:

$$X=\frac{360{,}000-120{,}000}{80-20}=\frac{240{,}000}{60}=4{,}000 \text{ tons of measurement cargo.}$$

This formula has been used for loading cargoes of cork and pyrites at Portuguese and Spanish ports, and will be found applicable in many other comparable situations.

COMBINATION OF A NUMBER OF COMMODITIES

If there are a number of commodities, instead of only two, the problem naturally becomes more difficult. One example of stowage of such a cargo has already been given. It is possible, of course, that a cargo might be booked, all the items of which would have approximately the same stowage factor, and this stowage factor might be one that would put the average cargo vessel full and down. Many cargo vessels of the nonshelter-deck type will be put full and down by cargo stowing at about 50 to 55 cubic feet to the ton, while many shelter deckers require cargo stowing at about 60 to 70 cubic feet to the ton. The following list shows some of the more important commodities that, as frequently packed, satisfy the requirements for the two types of cargo vessels.

Commodities with stowage factors of approximately 50–55:
- Alum, cases.
- Apples, dried, cases.
- Asbestos, crude, bags.
- Asphalt, bags.
- Batteries, automobile, cases.
- Beeswax, cases.
- Bonemeal, barrels.
- Burlap, bales.
- Brake fluid, drums or cases.
- Candy, hard, cases.
- Canned goods.
- Castor oil, drums.
- Cocoa beans, bags.
- Flour, bags.
- Graphite, bags or barrels.
- Grease, lubricating, drums.
- Hardware, cases.
- Insecticide, household, cases.
- Lacquer, clear, cases.
- Milk, evaporated, cases.
- Nuts, metal, cases.
- Oilcloth, cases.
- Oil, lubricating, barrels or drums.
- Olives in glass, cases.
- Packing, asbestos and rubber, cases.
- Paint, cases.
- Paper, cases.
- Paperboard, cases.
- Razor blades, safety, cartons.
- Resin, drums.
- Shellac, cases.
- Soap powder, barrels.
- Soda ash, barrels.
- Sparkplugs, cases.
- Starch, bags.
- Tools, cases.
- Turpentine, drums.
- Welding electrodes, cases.
- Whiting chalk, bags.

Commodities with stowage factors of approximately 50–55—Continued.
- Wire cloth, cases.
- Wire, steel, cases.
- Wood-pulp board, cases.

Commodities with stowage factors of approximately 60–70:
- Abrasive grain, drums.
- Acid, tartaric, barrels.
- Alcohol, drums.
- Beans, dried, bags.
- Bristles, cases.
- Butter, casks or tubs.
- Chipboard, bundles.
- Coconut oil, drums.
- Coffee, green, bags.
- Cork sheets, cases.
- Cornstarch, bags.
- Cotton duck, bolts or rolls.
- Eggs, dried, cases.
- Grease, lubricating, barrels.
- Hose, rubber, cases.
- Lard, tierces.
- Leather, cases.
- Oleostearin, barrels.
- Paper, printing, rolls.
- Paper, tissue, rolls.
- Plasterboard, crates.
- Rubber compound, drums.
- Rubber hose, bales.
- Scouring powder, cases.
- Soybeans, bags.
- Talc, bags.
- Valves, brass, barrels.
- Vaseline, petroleum, barrels.
- Vulcanized fiber, cases.
- Wax, paraffin, barrels.
- Wheat germ, bags.
- Wood-pulp boards, bundles.
- Zinc oxide, barrels.

It is, of course, in connection with planning the stowage of a mixed cargo of numerous commodities that the lists of stowage factors given in this volume will be most useful. Lists of this kind enable those in charge of stowage to determine within reasonable limits the amount of space that will be occupied in the ship by each consignment of cargo. The weight of each consignment will also be known from the shipping documents. Use of this combined in-

formation relative to weight and space makes it possible to plan in advance the disposition of cargo and in some instances to obtain other cargo that will help to put the ship in a full-and-down condition.

STOWAGE OF TYPICAL CARGO

The following description of miscellaneous cargo, based on a cargo selected by Annin,[1] is given to illustrate further the various points discussed in this and the previous chapters, as well as to illustrate again the principles involved in the process of building up "payable tons."

The vessel is one with a deadweight cargo capacity (weight of fuel and stores deducted from total deadweight) of 6.000 tons, and a net cubic capacity (10 percent deducted from the bale capacity for broken stowage) of 297,000 cubic feet. The cargo, as booked, will appear as follows on the ship's cargo sheet:

Commodity	Total weight (tons)	Measurement (cubic feet)	Freight basis	
			Weight (tons)	Measurement (tons)
16 M boards	20			
2 cars staves	30			
Steel billets	1,000	12,000	1,000	
Machinery	800	56,000		1,400
2,500 barrels	500	30,000		750
Salt meats	1,500	75,000		1,875
Bale leather	200	24,000		600
Turpentine	200	12,000		300
Oil cake	800	28,000	800	
10,000 bags sugar	500	25,000		625
Automobiles	100	15,000		375
3,700 cases, condensed milk	100	5,000		125
Miscellaneous	250	15,000		375
Total	6,000	297,000	1,800	6,425

The problem now is: Where and how to stow each of the items of cargo.

Several of the items, by their character, suggest immediately the positions they will occupy and the purposes they will serve. These are the boards, staves, steel billets, sugar, and condensed milk. The boards and staves will serve as dunnage; the steel billets for stiffening and also for trimming; the condensed milk for beam filling; and the sugar for filling in and topping off. The sugar, of course, must be carefully stowed so that the bags will not be cut by other cargo, nor their contents injured or tainted by leakage, odors, etc.

These items do not ordinarily pay high rates; but their usefulness and the fact that they eliminate the necessity of buying dunnage are important compensating factors.

Several of the items in the cargo pay well and will tend to even up on the revenue: 800 tons machinery, 200 tons bale leather, and 100 tons automobiles. These are all bulky commodities of high value and ordinarily pay good rates. They will tend to restore the equilibrium between weight and cubic, which was offset by the 1,000 tons of steel billets.

The 1,500 tons of salted or smoked meats and 800 tons of oil cake are fairly close stowing (i. e., have relatively low stowage factors), are of good value, and usually pay a satisfactory rate.

Twenty-five hundred barrels of lubricating oil and 2,000 barrels of turpentine are of about average stowage. The turpentine might be taken for carriage "on or under deck," ship's option. These two items are only fair cargo, but can be handled rapidly, which is a consideration. The last item—250 tons miscellaneous—is a summary statement of a variety of small engagements of all classes of cargo. The stowage (50 feet to the ton) indicates a fair pro-

[1] Annin, Robert E. Ocean Shipping. The Century Co., New York, 1920. pp. 156–164.

portion of heavy goods. There should be a number of packages included that will serve as beam filling and small stowage, and the goods would pay full rates.

The stowage of the cargo can now be planned. To insure an even distribution of the heaviest cargo, 175 tons of steel are placed in each of the four lower holds, the ballast tank tops and ship's sides having been properly protected with dunnage. An additional 175 tons is allocated to the 'tween decks, thus raising the center of gravity, and the remaining 125 tons are held out to use for trimming when the stowage has progressed further.

Lower hold No. 1 is then stowed with barreled oil, which fills it well when topped off with condensed milk. Upper No. 1 hold is filled with barreled turpentine and topped off in the same way. The turpentine can thus be easily reached in case of fire, while no cargo underneath or on top can be damaged by leakage or fumes. The condensed milk, being in sealed tins, is immune from the odor or leakage of the turpentine. Sensitive material, such as flour, sugar in bags or barrels, or tobacco in boxes, could not be used in this way.

No. 2 lower hold is the compartment in this ship most suitable for accommodating large cargo or awkward packages. Nos. 4 and 5 have greater cubic capacity, but they are cut in the center by the high shaft tunnel, which makes it difficult to stow cargo that does not handle easily. No. 2, however, not only has large cubic capacity, but also the clear space and headroom to handle awkward bulky packages. This hold, as well as Nos. 1, 4, and 5, already has 175 tons of steel billets in the bottom. Over the billets in No. 2 most of the 800 tons of machinery may be stowed. The large packages will not fit up close to the beams; hence some of the bagged sugar is used above, the machinery first being covered with dunnage boards. Above the sugar a tier of canned goods may be placed to protect the bags from cutting or wearing on the edges of the beams. Between the beams, canned goods, condensed milk, or small general cargo will be used for beam filling. No. 2 hold in the 'tween decks will care for the rest of the machinery, part of the automobiles, and canned goods and miscellaneous cargo to fill in.

No. 3 holds, both lower and 'tween decks, adjoin the boiler rooms and hence, owing to high temperature, are not suitable for any cargo that will deteriorate with heat. Oil cake and sugar might be placed here—the oil cake aft and the sugar forward. Note that from No. 2 hold aft, the stowage is progressively of heavier and more closely stowing goods.

No. 4 compartments, which are just abaft the engine room, are likely to be almost as much affected by heat as No. 3, and along the central fore and aft line of the lower hold runs the shaft tunnel, perhaps 6 feet high, on each side of which are the 175 tons of steel allotted to No. 4. A bulkhead of oil cake may be built at the forward end of the hold, so that no sugar or meat will actually lie against the engine-room bulkhead. Aft of the oil cake the hold may be filled with salt meats, topped off with sugar. Meats, being classed as wet cargo, cannot, of course, be stowed over dry cargo like sugar. In No. 4 'tween decks can go the rest of the automobiles, with some topping and beam filling.

No. 5 holds, being farthest aft and well away from the engine and boiler rooms, are highly suitable for the salted meat and provisions. Since the shaft tunnel also runs through No. 5 lower hold, the same procedure is followed as in No. 4. The steel and the top of the tunnel are well floored over with dunnage boards; the hams, bacon, salt beef, and pork, tongues, and other packing-house products are then stowed, and the hold is topped off with such small goods as may be left.

During the process of stowing, the staves and boards, as the saying is, "have got lost." That is, they have been used as dunnage and have not diminished essentially the space available for other cargo. Their economy of use for dunnage, plus their economy of use for filling broken stowage spaces, warrants omitting their cubic from the estimates of total cubic space occupied by the cargo. Their weight is in the ship, however, and is allowed for. Also, as the stowage has progressed, the 125 tons of trimming steel have been so disposed as to trim the ship to suit the captain.

ALLOWANCE FOR DENSITY

Frequently, when the ship leaves the wharf, it will be some inches deeper in the water than it will be when outside, since the water of

many harbors is less dense than salt sea water. Consequently, the ship rises somewhat and draws less water as soon as it floats in sea water. According to the size of the ship and the density of the water where it loads, some 2, 4, or 6 inches may be allowed for this contingency. This is known as "allowance for density."

PAYABLE TONS

There are only two items of cargo on which the rate is charged on the basis of weight—800 tons of oil cake, stowing 35 feet per ton, and 1,000 tons steel billets, which stow at 12 feet per ton. All the other cargo stows from 50 to 150 feet per ton weight, so the space occupied, and not the weight, is the main consideration in figuring the freight charges. For "payable tons" purposes, therefore, this is measurement cargo, and payable tons will figure thus:

Weight cargo:		
Steel	tons	1,000
Oil cake	do	800
Total	tons weight	1,800
Measurement cargo	tons cubic	6,425
Grand total (payable tons)		8,225

The "payable tons" in this instance represent a gain of nearly 38 percent over the ship's deadweight capacity, and about 12½ percent over the cubic capacity. The example serves to illustrate how the loading of a vessel full and down by a careful selection of cargo (when such selection is possible) and its proper stowage, results in building up the voyage revenue.

CHAPTER VI

STOWING TO PREVENT DAMAGE OR DANGER TO THE SHIP OR CREW

[Adapted, in large measure, from Stowage of Ship Cargoes, Miscellaneous Series No. 92, chapter III, Bureau of Foreign and Domestic Commerce]

A ship may be damaged or destroyed, its efficiency impaired, or the lives of its crew endangered by improper stowage. Vessels have been lost from this cause, and it is incumbent upon everyone connected with the operation of oceangoing vessels to acquaint himself with the most common causes of such losses and the means by which they may be averted. The principal types of improper stowage which endanger the ship and crew are those which affect the stability of the ship and those which may contribute to the breaking out of fire.

The discussion of this aspect of stowage will be divided under the following heads: Improper vertical distribution of weights; Improper longitudinal distribution of weights; Improper transverse distribution of weights; Shifting of cargo; Damage caused by character of cargo; and Damage caused by stowing cargo in heated parts of the vessel or where there is danger of fire.

IMPROPER VERTICAL DISTRIBUTION OF WEIGHT

Improper vertical distribution of the cargo may give rise to danger largely because of its effect on the vessel's rolling.

Rolling, or the movement of the vessel from side to side, may result in injury to the ship, damage to the cargo, and loss of speed. If excessive, it may lead to the foundering of the ship. Because of its importance and because it can be controlled in part by the disposition of cargo, the ship operator and stevedore should understand its causes and the measures to be taken for its reduction.

There are two distinct problems here. One is that of stability; and the other the amount and speed of rolling; or, in other words, one problem is the danger of capsizing the ship and the other the damage done by excessive rolling. The fact that a ship is stable does not necessarily mean that it rolls relatively little. In fact, quite the contrary may be true.

STABILITY

With present-day ships it is less difficult than formerly to practice stowing methods that improve the stability of the ship. But even now many ships are easily upset by poor stowing, combined with heavy weather, and all may be endangered by gross carelessness in stowing.

The stability of a ship is its power to right itself when rolled to one side. This power depends upon the relation of the center of

gravity of the vessel and the center of buoyancy of the water displaced by the vessel.

Suppose a ship to be lying under normal conditions in still water (see fig. 48). The water line is represented by WL, the center of gravity by G, the center of buoyancy by B. Now, suppose the vessel to be rolled to a new position, so that the water line is W′L′.

Unless the load has shifted, the position of the center of gravity remains the same, but the position of the center of buoyancy has shifted to B′. Draw a line through B′ perpendicular to W′L′ and a line through B perpendicular to WL. Their intersection M is called the metacenter. Draw a line through G perpendicular to B′M and intersecting B′M at Z.

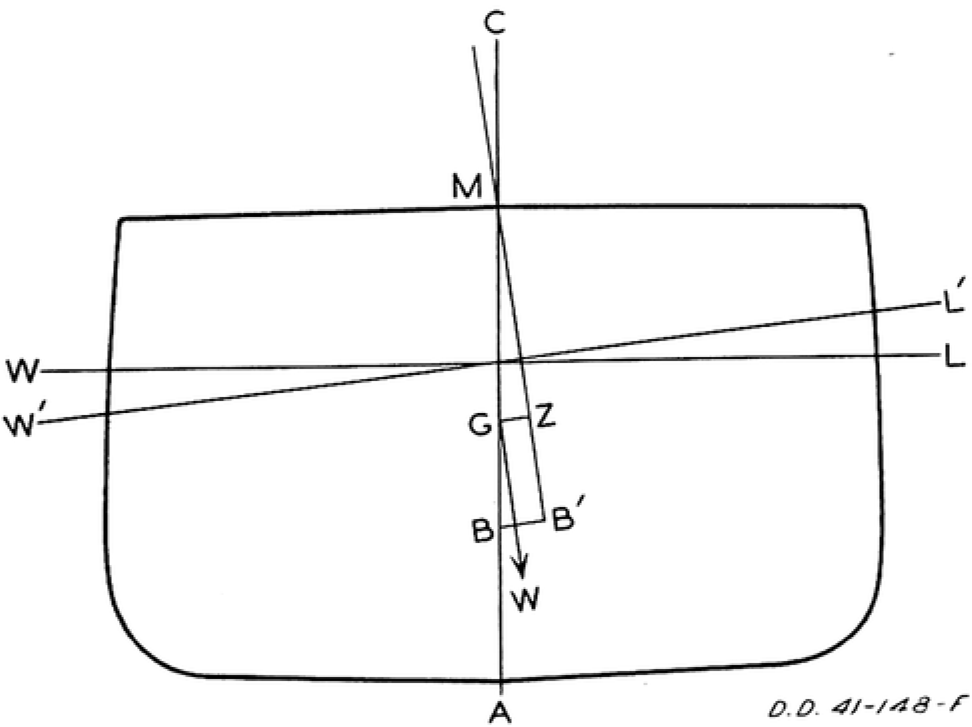

Figure 48.—Righting arm and metacenter of vessel.

The weight of the ship acts downward through G, and the pressure of buoyancy (equal in force to the weight of the ship) acts upward through B′. The force tending to return the ship to its original position is therefore a movement whose arm is GZ and whose weight is the weight of the ship. The weight of the ship remains constant; therefore the righting force depends upon the length of GZ, and GZ is called the righting lever.

STIFF AND CRANK VESSELS

From the figure it will be seen that if G and M coincide there is no righting lever, and the ship will stay in the position to which it has been moved. If M is above G the movement tends to return the ship to its original position; if M is below G the movement tends to move the ship still farther from its original position. In other words: (1) If the metacenter (M) is above the center of gravity (G) the ship is in stable equilibrium; (2) if the metacenter (M) coincides with

the center of gravity (G) the ship is in neutral equilibrium; and (3) if the metacenter (M) is below the center of gravity (G) the ship is in unstable equilibrium. In shipping language the ship is "stiff" if M is far above G, and "crank" if M is above but close to G.

Hughes[1] states that the "minimum value of the distance between the center of gravity and metacenter (GM) in steamers of medium size is about 1 foot when loaded with a homogeneous cargo that brings them to the load water line. For small cargo vessels the distance between the center of gravity and the metacenter should be not less than 9 inches, provided a righting arm of like amount is obtained at 30° to 40°. For sailing vessels a higher value of GM is required, the minimum being 3 feet to 3 feet 6 inches with a homogeneous cargo."

The proper vertical point for the center of gravity varies with the vessel and the cargo. If the center of gravity is too high, the vessel is likely to capsize. The beam and the freeboard help to determine the stability of the vessel, but the position of the center of gravity is the most important factor. If the center of gravity is low, there will be a strong force tending to return the ship to a vertical position after it has rolled to one side. If it is high, the force will be weaker;

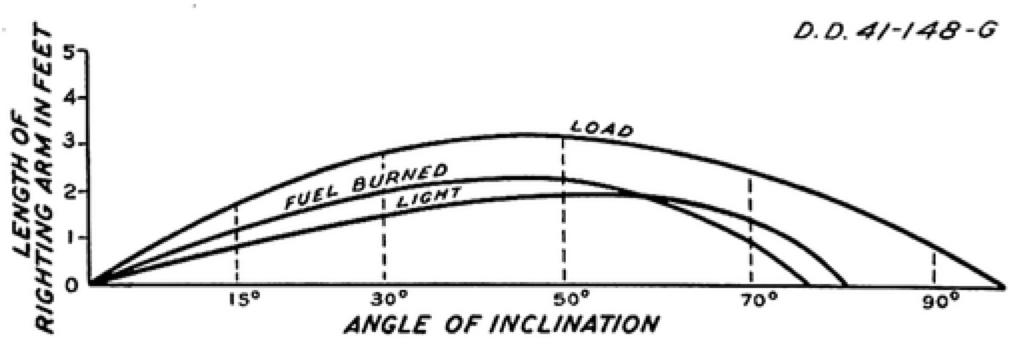

Figure 49.—Stability curves.

and if it is too high there will be no return movement and the vessel will roll over.

If the center of gravity is very low the righting force will be so great that the vessel will be brought up with a jerk, carried beyond the vertical position, and will then oscillate or roll until equilibrium is established. There is absolutely no danger of capsizing, but there is danger that the excessive rolling will strain the vessel and cause chafing and shifting of cargo. A ship in this condition is said to be "stiff," as contrasted to "crank" (see above) which is the term used to express an unstable condition.

The values of GZ (the righting lever) for different inclinations of a ship can be obtained by calculations. These values can be plotted, and the result is the "stability curve" of the ship. For the same ship a number of curves should be plotted to show the stability of the ship under different conditions of load. Figure 49 shows such a group of curves. From these curves the master of a ship can determine the value of the force tending to right the ship at a given angle of inclination under a given load.

The master of the ship should have, and should be able to interpret, the curves of stability for his ship, and he must go further

[1] Hughes, Charles H. Handbook of Ship Calculations, Construction, and Operation. D. Appleton & Co., New York. 1918.

than this. Obviously curves cannot be constructed to cover every possible condition of loading, and the master should be able to construct his own curves for variation in load. It is absolutely necessary that he determine the stability for loads that may cause danger. But what sort of load is dangerous?

From figure 48 it will be seen that the length of the righting lever depends upon (1) the height of the metacenter, M; (2) the position of the center of buoyancy, B; and (3) the position of the center of gravity, G.

The length of the righting lever will increase with increase in height of M, with change in the position of the center of buoyancy, and with decrease in height of center of gravity. Therefore the master must know what causes bring change in the positions of M, B, and G.

The height of the metacenter (M) depends largely upon the beam of the vessel and is fixed for small inclinations. Since alteration in stowing can make no change in the beam of the vessel, the ship's officers need not consider this factor.

The change in the position of the center of buoyancy depends primarily upon the freeboard of the vessel. If the freeboard is large, the position of the center of buoyancy will move farther at a given inclination than if the freeboard is small. Therefore a large freeboard means increase in stability, other things being equal. This has been recognized by maritime interests, and the minimum amount of freeboard has been prescribed by Lloyds, the American Bureau of Shipping, the Bureau Veritas, and by naval architects and shipbuilders.

In almost all cases, as the freeboard increases the center of gravity will rise; and raising the center of gravity may mean decrease in stability. The master cannot make his freeboard so small as to incur danger, for he is prevented from so doing by maritime law; and ordinarily he will not make his freeboard too large, because he wants his ship to carry the maximum load. If the amount of freeboard does become too large he will need to inquire into the position of the center of gravity.

Changing the position of the center of gravity is the most important way of changing the ship's stability and is at the same time the method that is most under the control of the master of the ship. In a cargo vessel the position of the center of gravity depends very largely on the disposition of the cargo, ballast, and stores. If most of the weight is low in the hold, the center of gravity will be low, the righting lever long, and stability assured. If the weight of the cargo is placed high, or if there is very little weight to the cargo, the center of gravity will be raised, the righting lever shortened, and the ship's stability endangered.

In every case, therefore, in which the character or disposition of the cargo is such as to indicate a rise in the center of gravity, the master should draw stability curves. The method of doing this is described in various handbooks, but essentially it consists of multiplying the distance the center of gravity has been raised by the sines of different angles of inclination, deducting the results from the original righting levers for those angles of inclination, and using the values thus obtained to lay off a new curve. If the new curve indicates stability the master may proceed in safety; but if the

new curve shows instability within any reasonable angle of inclination, he must change the center of gravity of the cargo and make a new trial.

To emphasize the importance of these precautions Taylor [2] states:

> The master may be inclined to scoff at these precautions. The old school has depended very largely on its judgment, and many hundreds of ships have been lost by faulty judgment on this very matter * * * Architects must supply the shipowner with the necessary information and the shipowner and master must be able to determine accurately the stability of the ship under any condition of load. It is to be hoped also that there will be more general installation of stability indicators, or of other apparatus for interpreting stability. The use of these would greatly simplify the problems of the master.

An example of improper stowage, which endangered the ship and caused the loss of part of the cargo, is that of a steamer which loaded a cargo of hay and subsequently took on board neary 800 head of livestock. This stowage made the vessel unstable and top-heavy, and, when heavy weather which ordinarily would have been weathered safely was encountered, the deck cargo was partly jettisoned and partly washed overboard. Judgment was given that the vessel was rendered unseaworthy by reason of the method of loading and that the shipowner was responsible for the loss because he did not put more deadweight in the bottom of the ship.

To sum up: The stability of a ship depends upon the metacenter. A vessel is definitely unstable if the metacenter is below the center of gravity. A vessel is tender if the metacenter is above the center of gravity, but only slightly so. It will remain upright so long as no heeling effort is exerted, but a very slight effort will cause the vessel to heel a good deal. A vessel is unable to remain upright at all if the metacenter is below the center of gravity. It is unstable. A vessel is stiff if its metacenter is more than a normal distance above the center of gravity for a vessel of its type. Otherwise its stability is normal. The vessel will become very stiff if ballasting lowers its center of gravity to an abnormally low point.

There is available a device, already installed in over 2,000,000 tons of shipping, which, without calculation and under any condition of loading, provides full particulars of trim, loaded draft, and metacentric height, and the effect of free surfaces in tanks. The device works on the principle of a pair of scales. A tray upon which is etched a profile of a ship is balanced on knife edges and the trim, draft, and stability are then read off specially constructed graph curves. The results are accurate for the particular conditions of stowage represented by the distribution of miniature weights corresponding to an actual or anticipated stowage situation.

EXCESSIVE ROLLING

It will readily be understood that the greater the righting force of the ship the more powerful and rapid will be the righting movement. With a large righting force the ship will be carried beyond the upright position and will only regain it after a series of oscillations from side to side. A "stiff" ship—one with a long righting lever—will therefore roll more rapidly and more violently than a

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[2] Taylor, Thomas R. Stowage of Ship Cargoes. U. S. Department of Commerce. 1920.

"tender" ship. Such rapidity and violence of motion may damage the cargo and endanger the ship. Many vessels have been damaged and many lost at sea because their righting forces were too powerful. When excessive rolling because of stiffness is combined with excessive rolling caused by synchronism of the ship with the waves the pounding becomes terrific and is more than likely to lead to disaster.

The facts are well recognized by all mariners; the difficulty lies in proper understanding of the causes and means of prevention. If more shipmasters knew the means of prevention there would be less cargo damaged and fewer vessels lost.

There are two important ways to prevent excessive rolling: (1) Increasing the "moment of inertia" by getting the weights as far from the center of gravity as possible; (2) decreasing the length of the righting lever.

The master cannot increase the "moment of inertia" to any considerable extent, since the weights he can move away from the center of gravity of the ship and the distance he can move them are not sufficient to alter the inertia a great deal. He cannot move the weights downward without increasing the "stiffness"; if he moves them upward he is simply decreasing the length of the righting lever (which is considered below); and so the only alternative is to move the heaviest weights as far out in the wings of the ship as possible. This is a method that is quite generally understood and followed. Perhaps without exactly understanding the cause, masters have realized that by placing heavy commodities in the wings the ship would ride more easily. But it is only in exceptional instances that any great change in the amount of rolling can be secured in this way.

Decreasing the length of the righting lever is accomplished by increasing the height of the center of gravity. For most modern ships—especially passenger ships—this is done in the construction. The Atlantic liners, particularly, are designed and built so that their centers of gravity are close to their metacenters. This, of course, decreases their righting levers and would seem to endanger their stability, but stability is assured by broad beams and high freeboards, which increase the righting levers at large angles of inclination. Many vessels, however, are built without broad beams and high freeboards to compensate for their high centers of gravity, and with these the master must be very careful that he does not raise the center of gravity to the danger point. In almost any event, moderation in rolling is gained at the cost of stability.

In every case the stability curve should be examined, and if the righting lever is too long the center of gravity should be raised by raising the weight of the cargo. Sometimes this is done by carrying a deck load. Ships loaded with lumber are likely to be "crank," (M above but close to G). In other cases, where the cargo is very heavy, the material is not lumped in the bottom of the hold but is stowed in such a way that its weight is raised as high as possible. Thus, bar iron is stowed grating fashion, sometimes with a solid layer at about the point where the center of gravity is wanted. Vessels with 'tween decks commonly stow about one-third of their deadweight cargo in the 'tween-deck spaces.

INFLUENCE OF DECK LOADS

A further source of danger from improper vertical distribution of weights is the practice of carrying exceptionally heavy deck loads. Many British vessels engaged in the coal and lumber trade between the United Kingdom and Baltic Sea ports are strained in this way. Walton [3] says:

> These vessels are severely strained, and sometimes take a set or sort of twist, and this is only discovered after the cargo has been removed, and perhaps not until even a few day later still, when the vessel, sometimes with a considerable report, frees herself from her strained condition with a severe trembling from stem to stern. On examination it is found that very many of the rivets in the heads of the hold stanchions or pillars have been sheared and considerable damage done to the beam knees. This is abundant proof that vessels intended to carry heavy deck loads require special strengthening.
>
> Such damage as that just explained might often be obviated by wedging or shoring the space between the top of the hold cargo and the beams, thus assisting the beams in enduring the strain of the deck cargo.

IMPROPER LONGITUDINAL DISTRIBUTION OF WEIGHTS

A vessel may be damaged or its efficiency impaired by improper longitudinal or fore and aft distribution of cargo. The distribution is improper (1) if it results in putting the vessel out of trim, or (2) if it keeps the vessel in trim but is so unevenly arranged that strains are set up. On account of the way in which cargo vessels are constructed, it is very easy to stow a cargo in such a way that both adverse results are obtained.

INFLUENCE ON TRIM

A vessel is said to be in trim when bow and stern are sunk to an equal distance in the water, and "trim" is defined as the difference between the drafts at bow and stern. If all heavy goods are loaded in the forward holds and light goods in the after holds, the ship will be lower at the bow than at the stern and therefore will be out of trim. Most ships are designed to maneuver best when they are in trim or when they have a slight "drag" aft; that is, when the stern is slightly lower than the bow. If the ship is out of trim it frequently maneuvers poorly and at the same time may be subject to strain.

When cargo is being loaded care must be exercised to avoid getting the vessel out of trim by placing too much cargo in one hold before work on the other holds is underway. It is not good stowing to fill up, or, in discharging, to empty, one end of the ship first, or to fill or empty an amidships hold first, and thereby cause strain throughout the whole ship.

LONGITUDINAL STRAINS

It is possible to have the vessel in trim and yet have such uneven distribution of cargo that damage may be caused. A vessel may be considered as a beam supported at various points by waves, with the holds representing loads that in many cases come between the points of support. The ideal condition of loading is that of a uniformly loaded beam, instead of one heavily loaded at one or more

[3] Walton, Thomas. Know Your Own Ship. Charles Griffin & Co., London. 1901. pp. 48–49.

points and scarcely loaded at all at others. If most of the weight is placed amidships, the strains set up may lead to the buckling or sagging of the ship amidships. If, on the other hand, all the weights are put at the two ends, violent pitching is encouraged and the crashing of the ends into the trough of the waves may result in "hogging"; that is, the ends will become permanently lower than the midship section. In either case, the vessel is damaged to a certain extent and strains are set up that may make it entirely unseaworthy.

In many cases these results have followed from strains set up during the loading of the ship. Because of the longitudinal division of the cargo space by bulkheads into holds, it is easy to acquire the erroneous idea that each hold is a unit in itself, and that the loading of one hold while others are empty can have no effect on the ship as a whole. Many vessels, however—especially those loading bulk deadweight—are seriously strained and deformed by stowage of this kind. It must always be remembered that the weight must be distributed as uniformly as possible in the holds at all times.

IMPROPER TRANSVERSE DISTRIBUTION OF WEIGHTS

A vessel should be so loaded athwartship that (1) list is prevented and (2) the weights are more or less uniformly distributed on each side of the keel.

LIST OF VESSEL

A vessel will be given a list if there is more weight on one side of the keel than on the other, or, more correctly, if the center of gravity is not vertically above the center of buoyancy. Listing will result in retardation of speed, in strain, and sometimes in capsizing

Owing to the attention that masters have given to it and to the ease with which it may be avoided, serious listing is rarely seen in any vessels except those that have had an accident of some sort. Care is generally exercised during loading to place articles aggregating approximately the same weight on each side of the ship's center line. Small differences, giving rise to a slight list, can usually be easily corrected by proper use of ballast tanks.

Sometimes listing results from accidents, such as leakage or the shifting of cargo. If the cargo does not completely fill the holds and if bad weather is encountered, an excessive roll of the ship may cause the cargo to shift to one side, and conditions may be such that it will remain in its new position. It may be impossible for the crew to move the weights so that the ship will be restored to an even keel, and the vessel must therefore continue on its voyage with a permanent list. Cases have been known where the cargo has shifted periodically with the heavy waves in such a way that the list was first on one side and then on the other.

Some vessels have a permanent list when empty. After about two-thirds of the cargo has been placed, effort can be made to remove this list by putting less weight on the "lame" or low side. With this type of vessel care must be used in keeping the weights low, for a high and heavy weight may emphasize the list.

Many cargo vessels—particularly those of British build—have more bunker space on one side than the other, owing to a relatively large passageway built in on one side. Such vessels may be given a list of

3 or 4 feet at the start of the voyage, especially when the port of clearing is some distance from the open sea, as at Philadelphia or Montreal, on the understanding that the engineer will take coal out of the larger bunker first and therefore right the ship before heavy weather is encountered.

TRANSVERSE STRAINS

If the weights are not uniformly distributed, strains will be set up between different part of the ship's bottom. Such strains are rarely serious, however, on account of the design which serves to distribute the load. In some cases it is advantageous for other reasons to provide an uneven distribution of weights. If, for example, the vessel is inclined to roll heavily, it is advisable to put the heavy weights far out in the wings. The harm from the resulting strains will be more than compensated by the reduced rolling.

STOWAGE OF CARGO TO PROVIDE STABILITY

Helpful comments and suggestions regarding the distribution of cargo in order to insure stability and other desirable conditions are given by George Nicol, Surveyor to Lloyd's Register.[4] These are quoted, in part, herewith as a guide to ships' officers and others entrusted with the responsibility of securing proper stowage.

It should be clear that to efficiently load a vessel does not mean simply to fill her with cargo in the shortest possible time. The nature of a vessel's sea qualities depends upon the manner in which the weights, including the cargo, are distributed, so that skillful stevedoring is almost as important as efficient designing.

The characteristics controlling a vessel's sea qualities have a conflicting interdependence, which makes it difficult in any given case to arrange for the values necessary to the best all-round results; with great stability heavy rolling is frequently associated, and with great steadiness a dangerously small margin of stability. It is thus clear that considerable care and experience is necessary in order to put cargo properly into a vessel. The superintendence of this work should, therefore, be entrusted only to thoroughly experienced persons, and owners who take no precautions of this sort may find the subsequent behaviour of their vessels to be scarcely all that might be desired. An intelligent and experienced officer can, with care, usually do much to bring about a satisfactory condition of his vessel. Even if he does not gain all he may strive for, his vessel should still be safer and more comfortable than if loaded in any haphazard way.

In loading general cargoes, an officer who knows his business will be guided by the characteristics of his vessel. If she be narrow and deep, he will place the heavy weights low in the holds and the lighter weights higher up, thus ensuring a comparatively low position of the center of gravity, necessary on account of the metacenter being low in position in vessels of this type. If the vessel be broad and shallow, the metacenter will be relatively high, and to obviate a too great value of the distance between the metacenter and the center of gravity (metacentric height), he will aim at a higher position of center of gravity, placing the heavy weights higher in the vessel.

Besides this, he will see that the weights are distributed longitudinally in such a way as to secure a suitable trim. Thus, with sufficient stability, steadiness among waves and a satisfactory fore-and-aft flotation may be secured.

The vessel's steadiness may be further improved, without affecting the stability, if, without raising them, the heavy items of cargo can be banked against the ship's sides, as the radius of gyration is thus increased and the roll period lengthened. Actual experience appears to indicate that, in ordinary cases, very little can be done to improve a vessel's condition, but the effect of "winging" the weights should not be lost sight of.

[4] Nicol, George. Ship Construction and Calculations. James Brown & Son, Glasgow. 1920.

The nature of a cargo, it is hardly necessary to point out, is always a determining factor of the style of loading. It is also admitted that circumstances may not always be favorable to good stowage. Suitable cargo may not be available for shipment at the correct time, and, in consequence, the heavy items may occupy positions either too high or too low, and at the center of the vessel rather than at the sides; but such a state of things may be considered exceptional. When the weights and other particulars of the various items for shipment are available, a good plan is for the officer in charge to make a rough estimate of the position of the center of gravity. In this way the best places for individual items of cargo may be determined before commencing operations, and, although in the process of loading departures may require to be made, these may readily be allowed for. On completion of the stowage, the metacentric height may be checked by means of an inclining experiment, and, if necessary, corrected by transposing some of the weights. Also, the roll period may be ascertained by forcibly heeling the vessel and counting the number of rolls. It is to be feared the value of such experiments is not fully appreciated. Owners make much of the trouble and loss of time involved, and do not give the encouragement they might to their commanding officers, and hence we find well-proportioned and designed vessels developing tendencies to excessive rolling, which the exercise of a little care at the time of loading would have done much to obviate.

It cannot be doubted that the carrying out of the experiments above described would afford invaluable experience to a commanding officer as to how particular kinds of cargo should be stowed in his ship to obtain the best results at sea. Such an officer might be said to "know his own ship." It sometimes happens, however, that a man is called upon to take charge of the loading of a ship of whose qualities he is in total ignorance.

In such a case an officer should be quick to notice changes in the vessel's condition during the process of loading. If he should observe her to suddenly list to port or starboard, he may take it her stability, in the upright position at least, is dangerously small, the sudden movement being caused by the raising of the center of gravity above the metacenter, and the vessel being put into a state of unstable equilibrium. The officer must on no account attempt to cure such a list by moving weights to the high side, as he might quite correctly do if the list had been a gradual one due to uneven loading. In the present case the raising of the weights would make matters worse, and, if the reserve of stability were small, might culminate in actual disaster. The only cure is to bring down the center of gravity by lowering the position of weights already on board, or shipping additional weights low down in the holds.

In the foregoing remarks we have assumed a more or less general cargo. The case, however, is different with certain homogenous cargoes. Suppose, for instance, a vessel has her whole cargo space filled with a homogenous cargo, of such density as to just bring her to the load water line. This is a trying condition of loading, as an unfavorable position of the center of gravity cannot now be corrected by shifting about the cargo. The only plan open is to discharge part of it, and this few owners would contemplate with any satisfaction. Such a resort, however, unpleasant though it be, would, under such circumstances of loading and position of center of gravity, be unavoidable if the safety of the ship at sea were to be considered at all.

Of course, vessels intended frequently to load homogenous cargoes of this critical density can always be designed to carry a full cargo with perfect safety. The naval architect would, in such a case, make this the one condition in which the vessel should have sufficient stability and trim properly, since it is the only one over which stowage has no control.

With homogenous cargoes of other densities, as with general cargoes, something may be done to correct a high position of the center of gravity due to faulty design. With those of lighter density, for instance, the whole cargo space may be filled as before, and the margin of draught taken up by running in water ballast; if the vessel has no tanks, heavy dry ballast may be put in the bottom of the holds before the cargo is loaded. With cargoes of greater density, the whole internal space will not be required, and so the position of the center of gravity can be affected by leaving an empty space in the holds, or in the 'tween decks, according as it is desired to diminish or increase the value of the metacentric height.

SHIFTING OF CARGO

Damage caused by the shifting of general cargo is less common today than formerly, although there are occasional cases in which shifting causes damage to the ship, such as buckling or bursting of bulkheads or the carrying away of stanchions. More common is the disabling or foundering and total loss of vessels loaded with bulk cargoes subject to shifting, such as grain, and sometimes coal, ores, and shingles.

There is always danger of cargo shifting as long as there is any empty space within the hold or not adequately partitioned off from the hold. It may shift in any one of a number of directions. There is a vertical shift if cargo in the upper part of a hold is lowered by reason of breakage below. This results in change of center of gravity and perhaps in lack of stability or increase in rolling. There is a longitudinal shift when cargo breaks through from one hold into another or when it breaks into empty spaces that may be left at the bow or stern. This results in change of trim and perhaps leads to heavy pitching. Finally, and most commonly, there is a transverse shift when the cargo moves from side to side of a partially filled hold. This may result in giving the ship a list.

All the results mentioned above, and their effects on the ship, have already been discussed. But there are other results that are common to all, and these are the strains and breakage caused by the force of the shifting movement. In some instances the shift may be very small and gradual, as when grain moves in a hold that is almost filled; in other cases the shift may be enormous and sudden, as when the lower tier of a cargo of molasses hogsheads gives way. In almost every case there is some damage to the ship. This damage may be the breaking or damaging of bulkheads or other parts of the ship's interior structure, the choking of the pumps, or other damage, including at times the loss of the vessel.

It is necessary, therefore, that every precaution be taken to prevent shifting of any sort. The best preventive, of course, is to leave no space into which cargo may shift. It is primarily for this purpose that efforts are made to stow compactly and completely, and that dunnage is used to fill up spaces into which other goods will not go.

But in many instances it is impossible, and in others inadvisable, to fill each space completely. If the cargo is very heavy the ship will have its weight capacity before its volume is filled. If the difference is small, dunnage is used; if the difference is great, it will not pay to use dunnage, and other methods must be used to keep the cargo in place. It may be necessary to leave ventilation or other passages through the cargo; and these may encourage shifting. If the ship tends to be lower at the bow, the forward part of the hold may be left empty to lighten that part, and if heavy pitching occurs the partition between the empty and full parts of the hold may not be strong enough to prevent the cargo from breaking through. In other instances enough cargo to fill the vessel may not be available. Again, the cargo may fill the vessel at time of sailing, but may settle, evaporate, be crushed, or otherwise decrease in volume to such an extent that shifting may occur.

PRECAUTIONS TO PREVENT SHIFTING

A number of examples of the methods used by masters to prevent shifting under these various conditions could be given. The problem presents so many angles, however, that it seems best simply to state the general principles back of protection against shifting and let the master work out the detailed methods to apply.

If possible, leave no space into which cargo may shift; if there is space left the cargo must be so thoroughly shored or secured that it cannot move under any probable circumstances; if the cargo will settle, some provision must be made to secure it after it has settled or to feed more into the empty space; with articles subject to crushing, such as barreled goods, the stowing must be very carefully done; if there is no way to prevent shifting, the shift must be confined to a small space, so that little damage will ensue. Thus, in cargoes of grain or like commodities "shifting boards" are used to divide the hold into small compartments.

Various measures are adopted to prevent shifting of certain types of goods that do not fill the space allotted to them. Railway iron, heavy logs, etc., are sometimes bound with chains, which are then fastened to parts of the vessel. Similar methods can be used for many other large units. If the units are small, they can sometimes be covered with boards, tarpaulins or matting, and roped down. Large and heavy pieces can sometimes be "tombed" down or secured by shores set against the beams.

SECURING CARGO WITH METAL STRAPPING

Experimental work has been carried out in securing cargo against shifting by using metal strapping, and it is possible that this practice may come into considerably wider use as more data on its application is made available. To date, strapping has been employed chiefly by coastwise steamship companies, but a number of oversea lines have also studied its use and in some cases have applied the method in connection with small consignments.

The following statement, provided by a coastwise steamship line, gives an interesting résumé of the company's experience with strapping:

> We have found thus far that satisfactory results can be obtained for the securing of cargo such as structural steel, pipe, so-called dimension lumber, and flooring. In the majority of cases, the lading is secured to stanchions, battens, or fixed instruments of the ship to prevent shifting.
>
> In the case of commodities such as flooring, a system known as "unit-loading" is employed. This constitutes the binding of a single bundle of flooring of sufficient volume to forego the possibility of shifting. In the transportation of such cargo, from point of receipt on our terminal to place in ship, and from place in the ship to point of delivery, we use either four-wheeled platform trailers towed by powered tractors or powered lift-trucks with forks to pick up and carry the bundles. Either method is capable of handling a capacity of about 6,000 lbs., therefore, the unit-load bundles are kept within this weight limit, or to such dimensions as will permit handling with this equipment.
>
> While our experience has not been sufficiently broad to speak more authoritatively, we are continually endeavoring to find new uses for the steel strapping method in our operation and we feel that it has real value.

DAMAGE CAUSED BY SOME TYPES OF CARGO

There are a great many commodities of such nature that their carriage endangers the health or life of the crew and passengers and the safety of the vessel. Goods that produce dangerous dusts or odors and those that are liable to spontaneous combustion are discussed in the chapter, "Stowing to Avoid Damage to Cargo," and inflammable, explosive, corrosive, and poisonous articles are dealt with in the section, "Dangerous Goods." There remain to discuss only those articles that lose or gain weight during a voyage, and the danger from these is relatively unimportant.

ARTICLES THAT LOSE WEIGHT OR VOLUME

It is true that articles that lose weight or volume during the voyage may cause the shipowner much trouble, but this is principally because he cannot deliver the quantity shown on the bill of lading, and only to a minor degree because of the disarrangements brought about in the stowage. The following is a list of articles mentioned by Stevens and Hillcoat[5] as losing weight, with, in some cases, the percentage of loss on a voyage of average length: Areca nuts (8 to 10 percent), bones, candy (5 percent), gambier (5 percent), guano, hides (3 to 6 percent plus 15 percent loss on pickle), ice, jaggery (10 percent), molasses (15 percent), nitrate of soda (3½ to 5 percent), potatoes, pig iron (1 to 2 percent), rice (8 percent), salt (2½ to 7½ percent), saltpeter, sand (wet), seeds, silk (4 percent), sugar (5 to 20 percent), sulfate of soda, tallow, tea (4 percent in some cases). This list is not complete nor is it thought to be altogether accurate, but it is given to indicate the kinds of commodities that lose weight. The loss may be caused by evaporation, drainage, rot, chafing, or by waste of material associated with the commodity at time of shipment, as dirt or sand with potatoes and pig iron. The loss in weight generally also means loss in volume.

In a few cases where the percentage of loss is very high, the stowage may be altered enough during the voyage to entail some danger or damage by changing trim or by permitting shifting. Thus, salt in bulk may under very unfavorable conditions be dissolved in such large quantities that the cargo will shift. But more serious than this possibility is the damage that may be done to the ship by the wasting processes—particularly the rusting of metallic parts owing to moisture from wasting commodities, the choking of the pumps by waste products, and the coating of dirt or grease that must be cleaned from the hold after the discharge of cargo.

ARTICLES THAT GAIN WEIGHT OR VOLUME

Articles that gain weight or volume during the voyage do so largely by the addition of water. Some articles absorb moisture from the air or from nearby "wet goods." Ordinarily there is no danger to the ship in this, but if the additional weight or volume becomes

[5] Stevens, R. W. On the Stowage of Ships and Their Cargoes. Longmans, Green & Co., London, 1894.
Hillcoat, C. H. Notes on the Stowage of Ships, p. 23. Imray, Lowrie, Norie & Wilson, London, 1918.

very great, some harm may result. Coke and charcoal may gain 20 percent in weight by absorbing moisture, and a vessel carrying a cargo of one of these commodities might encounter difficulties because of this fact. Grain is probably the best example of a commodity that may gain so much volume, under the influence of heat and moisture, as to become dangerous; but this swelling is generally offset by the settling of the grain.

ARTICLES THAT GIVE OFF CARBON DIOXIDE

Seamen, stevedores, longshoremen, and others whose work necessitates the handling of cargoes aboard ship were recently (December 1940) warned by the United States Bureau of Marine Inspection and Navigation to be constantly on their guard against the danger of carbon dioxide gas. The Bureau cited two outstanding instances in which fatalities resulted from this source. The first occurred in connection with a shipment of cherries where dry ice had been packed into the hold to keep the fruit fresh and the hatches had then been closed. The evaporation of the dry ice resulted in the development of carbon dioxide, but being odorless, colorless, and tasteless, there was no sign of its presence. Five men met their deaths as a result of asphyxiation. The other case was reported in connection with a little-known cargo, castor pomace, a fruit byproduct used as a fertilizer. Here again carbon dioxide developed in death-dealing volume and, as a result, one longshoreman met his death and another was resuscitated with great difficulty. These examples, the Bureau pointed out, bring home the need for the utmost care in the handling of cargo and the proper understanding of the nature and effect of carbon dioxide gas. Workers are warned never to enter a hold or a suspected area without some form of oxygen-breathing apparatus or fresh-air nose mask.

DAMAGE CAUSED BY STOWING CARGO IN HEATED PARTS OF VESSEL

There is danger in some ships of many kinds of ordinary or nonhazardous cargo being damaged or even set on fire if they are stowed in parts of the vessel where the heat from the engine and boiler rooms may reach particularly high temperatures. Such locations include bridge or shelter deck and 'tween-deck spaces, in which the fiddley or uptake casing and the saddle back lead through the spaces. To guard against the danger of fire in such spaces, the Board of Underwriters of New York has issued the following:

RULE FOR PROTECTION OF CARGO STOWED IN DECKS ADJACENT TO BOILER ROOM CASINGS

Steamers with a bridge or shelter deck and 'tween-deck spaces in which decks and fiddley or uptake casing and saddle back lead through such spaces, shall have such uptake casing and saddle back protected by cargo battens when cargo is carried. These battens must not be less than six (6) inches off the steel bulkhead forming the entire casing. Only suitable cargo should be carried in these spaces and rags should not be permitted. These spaces must have ventilators and the space in the 'tween decks, known as the pockets, shall also have ventilators. These ventilators should be covered with a fine gauge wire for protection against sparks.

It is advisable on many ships to reduce the heat ingress into cargo by sheathing hot bulkheads or by leaving a space between bulkhead or ship's sides and cargo through which cool air may be circulated. (See fig. 50.)

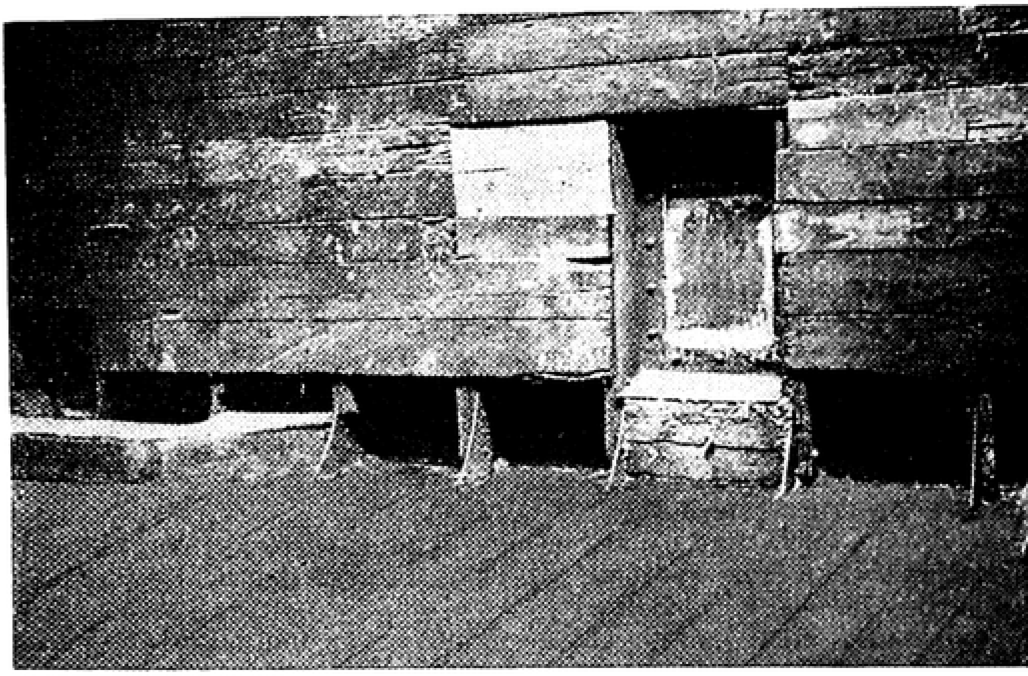

Figure 50.—Boiler-room bulkhead in lower hold sheathed with planks to reduce heat transfer into cargo.

CHAPTER VII

STOWING TO AVOID DAMAGE TO CARGO

Damage to cargo, caused by some form of improper handling or stowage, is of many different types. All are relatively common, however, and all are in some measure preventable if those in charge of the work are experienced in methods of preventing such damage.

The principal types of damage to cargo during its handling and ocean transportation are discussed in the sections which follow.

IMPROPER LOADING AND UNLOADING

Cargo may be damaged in a number of ways during the process of loading and unloading. Indeed, it has frequently been asserted that in many instances more damage is caused by rough or careless handling on the dock than by any other factor involved in ocean transportation. The more common causes of damage during loading and unloading are described below.

Damage by cargo hooks.—Hooks should never be used on any package into which the hook may sink with destructive results. This includes bags, bales, fiberboard cartons, plywood boxes, and various other types of containers. The use of hooks on these goods should be forbidden, just as matches are forbidden in a powder plant. At times. it may be advisable to have all the longshoremens' hooks collected and put aside while cargo packed in certain types of containers is being handled. A hook will bite into a cotton bale, tear out some of the cotton, and expose a section of fiber to destructive elements. In the same way a hook may penetrate a cask containing a liquid, and the contents will then be partly or wholly lost or will leak and damage other cargo stowed beneath. Longshoremen's hooks are indispensable, but they must be handled carefully, or they needlessly cause a serious amount of damage.

Fragile and heavy cases in one sling.—In order to speed up loading, a sling may be filled with assorted cases containing packages of different weights and strength, and lightly constructed boxes may be underneath cases containing dense heavy goods. If the light-weight boxes are not crushed or broken in the hoisting process, it is possible that they will be when the sling is lowered with some force into the hold.

Oftentimes a sling contains a number of assorted boxes that may total 10 feet in height. Even though the fragile boxes are placed on top, this may not protect them, for when the sling is opened in the ship's hold it is possible that some of them will fall and be broken open.

It is best to put in one sling cases of nearly equal weight and strength. Care should be taken not to tier cases too high in a sling. Putting fewer cases in a sling and building them up in the form of a pyramid will help greatly to reduce damage.

The growing adoption of platform or airplane slings is helping to reduce damage caused by pressure of rope slings against packages being hoisted or lowered between ship and dock. In this connection, see the section on "Loading and Unloading Equipment and Methods."

Careless handling of ship's gear.—Slings may in some cases be so insecurely fastened around the load that part or all of the load will be released in midair and fall with great force. With heavy cases, particularly, exceptional care must be exercised in adjusting the slings employed. With some classes of goods the slings must not only be secure but must be so adjusted that the strain will not fall upon a weak part. Barrels are broken open in some cases by an adjustment which puts a load on the heads, which are the weakest part of a barrel. If a case is in bad order, special care must be used.

In swinging the load, carelessness may result in scraping or knocking it against some part of the ship or dock, with consequent damage; or the load may be lowered with such speed and force that cases are crushed or broken. Experienced men should be selected to handle the ship's gear, and the system of signals used must be simple and clear.

For any water that gets into the holds by way of leaks, condensation, ventilating system, etc., an efficient drainage system should be provided, which must be kept in good working condition at all times. Drain plugs and lines, scuppers, and the like must be kept clean. No open bilge well should be in the lower holds. Bilges must be kept dry. Any condensation or other moisture on the sides of the ship should drain easily into the bilges and not accumulate on structural members.

Loss of small articles.—Loss of small articles, particularly those of considerable value, is sometimes traced to pilfering on the pier or in the ship's hold during loading or unloading. There should be an adequate guard over the goods being loaded or unloaded.

Sorting and piling.—Either on the dock or in the hold sorting and piling may be so carelessly done as to involve considerable damage. Cases may be sent crashing into one another, barrels may be piled up insecurely and dangerously, bales may be cut open by scraping them against sharp projections, and fragile goods may be crushed and broken by piling heavier goods on top. Some officer of the ship should exercise constant supervision over the work of the longshoremen to prevent this, as well as other types of bad and improper stowage.

Weather.—Proper protection against the weather must be given to the goods being transferred to or from the ship. Usually, when it is raining or snowing, canvas hatch tents are rigged over the hatch openings and these provide good protection for goods already in the ship or being lowered into the hold. Another practice, which should always be followed, is to cover sling loads of cargo with tarpaulins to protect them while being lifted from the pier to the shelter of the hatch tent.

The hatches must be of good watertight construction and must be closed tightly at sea or in port when cargo is not being worked. Rain is easier to guard against than snow. It was recently observed that during a night in port the hatch tarpaulins were merely laid over the hatches, though hanging down over the coamings on all

sides. During a driving snow storm a considerable amount of snow was blown under the tarpaulins and through the cracks between the hatch pontoons into the cargo hold. Likewise, snow entered the holds through the ventilators under conditions where rain and spray would not enter them.

To protect cargo against weather damage, both at sea and in port, the ventilator heads should be weatherproof so that they need not be closed during ordinary rain and spray conditions. For extreme conditions a watertight cover must be provided which keeps all water out of the holds. (See fig. 51.)

IMPROPER DUNNAGING

In the opinion of some authorities, the greater part of the damage that occurs to cargo during the ocean voyage is attributable either

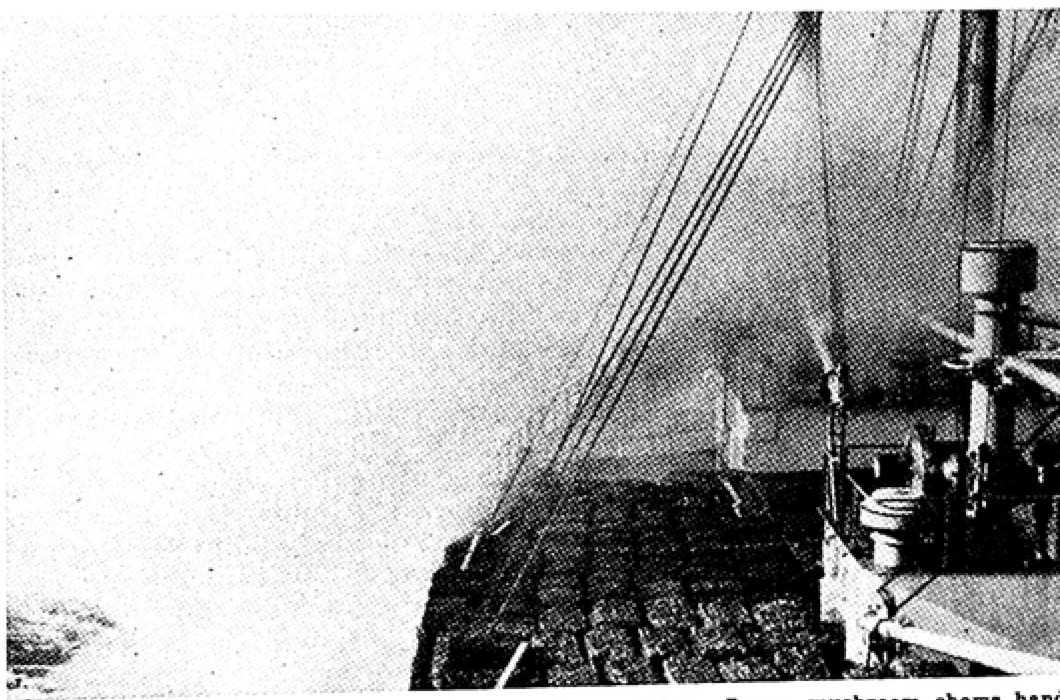

Figure 51.—Weatherproof ventilator heads in heavy spray. Lower mushroom shows handwheel of watertight cover. Upper exhaust-type head shows drain pipe from funnel inside.

to lack of dunnage, unsuitable dunnage, or to dunnage being wrongly placed.

Many examples might be cited to substantiate this view. In connection with a cargo of bagged linseed, for instance, the ship was well dunnaged along the sides, but when condensation of moisture on the ship's sides occurred, water ran out over the floors of the 'tween decks. These were insufficiently dunnaged, with the result that the lower tiers of bags were damaged and there were heavy claims.

Articles like hides are frequently damaged through lack of dunnage, being stowed on top of or next to barrels, with no dunnage between, so that the hides are injured by the rusty hoops. In other cases hides are damaged through being allowed to contact the metal parts of the ship.

The subject of proper dunnaging is more fully discussed in the section, The Use of Dunnage, chapter IV, and further details are given as to how dunnage should be laid.

DAMAGE FROM CRUSHING

Crushing of goods or their containers may be the result of carelessness or unavoidable accident during loading or discharging, of bad stowage in the hold, or of inadequate packing. In connection with the latter point, shippers should note that it has been ruled by the United States Circuit Court of Appeals that neither a vessel nor its operator can be held liable for damage if goods offered for shipment are not cased or wrapped in a manner to withstand the ordinary hazards of an ocean voyage, always providing that such cargo has been stowed with usual care in accordance with the prevailing practice. This ruling is discussed at greater length in chapter I.

Well-packed goods, however, are in many instances damaged by crushing owing to bad stowage. Several examples may be cited to illustrate the damage that may occur. In one case a vessel had bales stowed in the midship part of a hold, heavy cases in the wings, and boxes of fruit stowed on top of the bales. As the bales were not rigid, the boxes of fruit sank into them and many of the bales in the upper tier were crushed.

In another instance an uneven tier of different sized cases was boarded over to make a level surface on which to stow cases of lard. The boards were not sufficiently strong, however, and bent down over the spaces between the boxes in the lower tier, with the result that many of the lard boxes were badly crushed where they projected over the edges of the boxes below. In this case the cause of the crushing might be classed as insufficient or improper dunnaging.

Other cases have occurred in which small boxes stowed on top of cases containing automobiles have crushed in the top of the automobile cases. Another example is that of a shipment of turpentine in casks which was damaged and lost in part because the bottom tier of casks was placed on an uneven footing of timber and shifted during the voyage, thus allowing the pressure of the upper tiers to crush casks in the lower tier.

Some precautions which may be taken to avoid crushing damage are given below:

Heavy packages, such as cases of machinery, and heavy pieces, such as metal billets, pigs, and ingots, should always be stowed in the bottom, with lighter goods on top.

Light or fragile packages, as a general rule, should be stowed in the 'tween-decks. If necessary, heavy goods can be stowed on the floor of 'tween-deck spaces, with the lighter goods on top of them.

If bottom cargo is of such a nature that there is danger of its being damaged by crushing—such as tight barrels containing liquids—the goods stowed on top should be light in weight.

Each tier should be kept as level as possible. As mentioned elsewhere, packages should not be stowed too close to the turn of the bilge where they will rest at an angle.

Stowage should be as compact as possible. Spaces which cannot be filled in with suitable small packages should be tightly filled with cordwood or other suitable dunnage, both to provide a level platform for the tier above and to prevent any movement of the cargo.

Lateral crushing should be guarded against by stowing sturdy substantial cases in the wings at the sides of each tier. Lighter containers and crates should be put near the center.

Dunnage boards of sufficient strength and thickness should always be used where needed to protect light-weight packages from being crushed by heavier goods.

DAMAGE FROM CHAFING

Chafing damage is caused by the motion of the vessel, which causes the packages in the cargo to rub against each other and against projections in the hold or tween decks. The vessel need not roll or pitch to give rise to chafing; even in good weather the vibrations of the engines may be transmitted to packages in the cargo, causing them to rub continuously against each other. Chafing damage may also be caused to bales and bagged goods by dragging other cargo over them during the stowing of the ship, or by moving them over rough-surfaced dock floors or skids.

Cargo that is especially liable to chafing damage includes baled goods such as textiles and cotton piece goods; bagged cargo; materials put up in rolls such as paper, rugs, linoleum, and leather; and goods shipped with little or no outer covering, such as wallboard, cordage, and coils of copper piping.

When stowing goods that are particularly liable to chafe, such as the above, the following precautions should be taken:

Mats, burlap, or other protective materials should be used wherever considered necessary and in sufficient quantities to prevent bales, etc., from rubbing directly against one another.

The stowage should be compact and solid so as to prevent movement of individual packages.

Baled goods and similar merchandise should not be stowed directly against hold projections or rough surfaces such as frames, brackets, deck beams or pillars. Soft mats and adequate quantities of board dunnage should be used between the goods and such projections.

Baled goods, such as textiles, should never be used for beam fillings.

Baled textiles, leather, etc., should be stowed on the flat, so that only a small portion of the contents will be damaged if chafing occurs. Wing bales, however, should be stowed on end to confine possible chafing damage against the ship's side to the flat, where only the outer part of the contents may be damaged.

Cargo with little or no covering, such as wallboard or slabs of fiber, should not be stowed on edge, unless the edges are thoroughly protected against chafing damage by cushioning material.

CONTAMINATION, TAINTING, AND DUST

Cargo can be damaged by contamination or tainting either by contact with oil, dirt, coal dust, and other substances commonly found in ships, or by taint absorbed from other cargo stowed nearby. Foodstuffs are especially subject to damage by tainting.

Circumstances which may give rise to serious damage of this type include:

Leakage of fumes from fuel-oil tanks.

Failure to clean a hold which has carried dirty or odorous cargo.

Failure to clean the bilges.

Use of strong-smelling disinfectants for cleaning holds and bilges.

Leakage of coal dust into the cargo holds.

Use of dunnage which has previously been used for odorous cargo, such as creosote or essential oils.

Spreading of dust from cargo (usually bagged), such as cement, fuller's earth, sulfur, dried blood, dry ores.

Failure to clean thoroughly tanks used for the carriage of edible and other vegetable oils.

Stowage of odorous or otherwise potentially harmful goods in close proximity to foodstuffs and other cargo which is susceptible to contamination or tainting damage.

To protect cargo against damage of this kind, the holds and bilges should be thoroughly cleaned after the carriage of odorous or otherwise harmful cargo. Strong-smelling disinfectants should not be used for cleaning holds, and the practice of coating the bilges with crude oil (as a preservative for the ironwork) should be avoided. The dunnage to be used should be carefully inspected and all dirty or oily boards should be discarded. Tanks in which vegetable or edible oils are to be carried should be cleaned with particular thoroughness and care.

Damage to cargo from coal dust is practically a thing of the past, particularly in connection with American-flag vessels which today are nearly all oil-burners. On coal-burning vessels, coal carried in the bridge space or 'tween-deck space should be separated from cargo by means of tightly-built bulkheads, and the ventilator cowls should be covered when the vessel is bunkering.

Damage caused by dust from cement and similar commodities settling on other cargo is best avoided by covering with separation cloths, stout paper, tarpaulins, or similar materials goods that are liable to such damage. Dusty goods or commodities like plumbago, from which there may be siftage of contents, should not be stowed over goods that will be damaged by dust. If circumstances permit, the best course is to load the dusty cargo first and then sweep down thoroughly before loading other cargo.

Many parcels of cargo are damaged through being stowed adjacent or close to other goods which give off taint or odor. Numerous examples might be cited. In a recent case, a consignment of expensive tobacco was tainted because it was stowed too close to a consignment of valonia, a substance used in tanning. In other instances, flour has been damaged through being stowed next to beef casings, apples, or essential oils, and cased eggs have been tainted by apples, even though the apples were in the lower hold and the eggs in a 'tween-deck space.

Prevention of this type of damage requires a thorough knowledge of the properties of the many articles carried in ocean commerce, and of what particular commodity will taint or be tainted by another. Wherever possible, mention is made in the chapter "Commodities and Their Stowage" regarding care which must be exercised to prevent tainting or contamination.

Some of the commodities which may taint foodstuffs and other delicate goods are creosote, creosoted articles, essential and aniline oils, copra, hides, petroleum, turpentine, newly sawn timber of certain kinds, cassia, onions, and green fruit. Some of these should be carried on deck or in deck houses; all of them should be stowed well away from cargo that might be damaged by them.

Taylor (op. cit. p. 87) gives the following list of commodities having odors which are obnoxious and which should, therefore, be stowed away from susceptible foodstuffs, such as tea, coffee, flour, spices, cheese, or wine. The list includes tobacco, sponges, vinegar, fire

damp, blue billy, sugar, and rum; ropes and mattings; naphtha soaps; fertilizers, especially guano, manure, and commercial fertilizers; vegetables, fruits, nuts, and grains, the decomposition of which will result in bad odors, especially potatoes, onions, tropical nuts, citrus fruits, copra, and rice; animal products of many sorts, particularly fish and fish products, dried beef, dried blood, green bones, hides, civet, and cantharides; petroleum and coal products, such as oils, creosotes, and coal tar; vegetable oils, gums, and barks, such as camphor and turpentine; chemicals of many sorts, especially many carbides and sulfides, chloroform, iodine, phenol, strong acids, carbon bisulfide; disinfectants, such as formaldehyde and chloride of lime, and chemicals emitting chloride and ammonia; and scents and spices, particularly asafetida, musk, patchouli, sumac, and cinnamon.

Staining damage is often caused by dripping water or by fumes, such as the effect of sulfurous fumes from vulcanized rubber on silk, or the effect of acetic and tannic acid fumes from green lumber on nail kegs, etc. In one case a shipment of tractors which were painted blue turned bright yellow, owing to the presence of some unknown fume, possibly aniline, present in the cargo holds.

LEAKAGE AND DRAINAGE OF WET CARGO

Containers holding liquids and other goods that are wet or moist, such as wet hides, have frequently caused damage by leaking onto other cargo. Furthermore, there are many commodities that will absorb moisture from wet goods stowed nearby to such an extent as to damage them seriously or in some cases ruin them. Dry cargo of this type includes such articles as pepper, tea, sago, arrowroot, some oil cake, and dried skins. Other cargo, such as mahogany, has been damaged by leakage from barrels of grease stowed above. Grease affects the glueing of the wood when it is made into furniture, and importers have consequently refused to accept shipments upon which grease has drained. Again, in one case, several thousand cases of apples being carried from the Pacific coast to Argentina were seriously damaged by the juice from ripe bananas loaded in Brazil leaking on them.

Wet goods should never be stowed above cargo that is liable to damage from moisture or leakage, nor on the same deck where leakage might spread along the floor and contact them.

Frequently, when a considerable volume of wet goods is moving, it is possible to stow all or nearly all such cargo by itself in a separate compartment. This is good practice, when conditions make it possible. When wet goods of different kinds are stowed in the same compartment, care must be taken to arrange the stowage so that leakage from the goods on top will not damage the cargo below nor stain clean containers. Lubricating oil should not be stowed over cases of refined oil; for example, casks of molasses over sugar, acids and oils over foodstuffs, or gambier (one of the most objectionable cargoes loaded in the Far East) over cargo of any description that might be damaged by the drainage.

Leakage is most likely to occur in cargoes of barreled goods, and the reader is referred to the section on barrels, casks, hogsheads, etc., in chapter IV, for information on the proper stowage of barrels to prevent breakage and consequent leakage.

Wet cargo can frequently be conveniently stowed in the 'tween decks. When this is done, however, it should be ascertained that the deck is watertight and free of bolt holes, and that the drainage pipes to the bilges are free, so that drainage may run off unimpeded. An additional point is that cargo stowed in the hold beneath should not be of such a nature as to be damaged by odors or fumes arising from the drainage after it has reached the bilges.

When wet cargo is stowed on the deck of the same hold with dry cargo, an extra layer of dunnage should be laid beneath the latter. An additional precaution is to place the wet goods at the end of the hold that, according to the trim of the vessel at time of sailing and during the voyage, will be the lower. This will permit drainage to flow away from the dry cargo.

DAMAGE FROM MOISTURE

This type of damage is commonly called "sweat damage." It is the injury done to cargo by condensed moisture, which may corrode metal products, stain burlap, tobacco, and lumber products, mildew textile goods, or cake such commodities as sugar, flour, salt, and cement.

The formation of sweat is basically caused by temperature conditions or by changes in such conditions during the voyage. Because of the very great amount of such damage that occurs each year to ocean-borne cargoes and because considerable research has recently been carried out in an effort to discover methods of lessening such damage, a special chapter, "Damage from Temperature Changes During the Voyage," has been devoted to this subject. (See ch. VIII.)

MIXTURE OF CARGO

Many claims arise each year because of mixture of one class of cargo with another, owing to insufficient separation of one lot from another. The most common claims of this type are probably in connection with bulk cargoes of grain or seeds; but there are numerous claims for other mixtures, such as oil seeds with jaggery (a sugar obtained from an Indian palm tree) in cargoes loaded in the Far East; oils with ore; china clay, coal, or seeds with silversand; charcoal with sugar, etc.

Precautionary measures that should be taken to avoid damage of this nature include:

> Careful allocation of space to avoid stowing goods that may sift downward over goods with which harmful mixture might occur. Do not, for example, stow bagged seeds over jaggery, oils over ores, cement over sugar or seeds.
>
> When different consignments of bagged goods, the contents of which may mix with other cargo because of siftage or torn bags, or bulk grain or seeds are stowed together, they should be separated (a) to prevent mixture, and (b) to enable the sweepings from the upper cargo to be collected as the discharging proceeds.
>
> To separate such cargo, separation cloths (large pieces of gunny cloth) should be used. If carefully laid, with sufficient overlapping, these will give satisfactory results. For a bulk cargo, the laying of separation cloths should be commenced in the square of the hatch. From here, the cloths should be extended to the wings and ends of the hold, each cloth generously overlapping the one next to it.

Mat separations for different lots of bulk grain are not recommended. Mats are too likely to be displaced by the grain poured on top of them from the elevator loading spouts, by men walking over them, or by the motion of the ship in heavy weather.

DAMAGE FROM FIRE

Fire damage on board ship is usually caused by spontaneous ignition or combustion of some commodity or by "dangerous goods" that are inflammable, combustible, or explosive. The latter classes of goods and the precautions to be observed in stowing them are dealt with in the section on dangerous goods, in chapter IX. Stowage of Special Cargoes. Mention of the first class of commodities is made at this point, because certain stowage precautions may be taken in connection with them to prevent fire damage.

When loading or discharging, smoking should be prohibited, and nonenclosed lamps and electric cables with frayed insulation should not be permitted in the holds or on deck near the hatch openings.

Barrels of water and buckets should be placed in convenient locations, and fire hoses should be connected and ready for use, when cotton or other inflammable goods are being loaded or discharged.

Wool, and other commodities which are likely to heat and cause fires if wet or damp should not be loaded during rain. If received in a wet or damp condition, such goods should be dried out before being loaded.

Great care should be exercised when sawdust is used to absorb leakage or drainage. If sawdust is used under commodities such as seed oil or linseed, there is a possibility that fire may break out during the voyage.

When some kinds of sulfur are being loaded, pieces may break into flames if they strike forcibly against steel or iron. Such a flame can be extinguished by throwing a shovelful of the sulfur over it, and a man should be stationed in each hold for this purpose.

Goods which are liable to spontaneous ignition or combustion, to which particular attention should be given in stowage, include lampblack, oiled materials and clothing, inodorous felt, quicklime, potassium, sodium, and carbides, sawdust, and cork dust.

Handling of fires.—Fires on board ship must be handled in different ways, according to the nature of the cargo in which they occur. Consequently, if a fire does break out, an effort should be made immediately to determine among what kind of goods it started.

If in a coal cargo or in the bunkers, the hatches should be taken off to give surface ventilation, and water should be applied at once as near as possible to the seat of the fire.

If the fire is among cargoes such as cotton or jute, the hatches should on no account be opened. On the other hand, all openings should be closed down as rapidly as possible, and steam should then be injected into the hold. (See section on cotton in the chapter, Stowage of Special Cargoes.)

If the fire is among general cargo, it is usually best, if possible, to keep all the hatches closed and to inject steam to smother the fire. The carbon dioxide produced by the fire will in due time assist in suffocating the fire.

The following description of how a fire was extinguished on a foreign-owned passenger and cargo-carrying vessel is of interest in this connection. The fire broke out in a 'tween-deck compartment and was apparently caused by spontaneous ignition of one or more hazardous articles. Goods stowed in the compartment included sodium nitrate, pharmaceutical products, photographic film (extremely hazardous and for that reason frequently carried in a special film locker on deck), and Christmas toys and tree decorations which possibly were made of pyroxylin plastic materials which are susceptible to ignition either by friction, spontaneous heating, or decomposition.

As soon as the presence of the fire was indicated by the smoke-detecting system, the ship was stopped and steam was injected into the burning compartment. However, the captain and chief officer were not satisfied with the efficiency of this method of extinguishing the fire, so three holes were burned in the overhead deck with an acetylene-burning outfit to admit a fire hose into the 'tween-deck compartment where the burning cargo was located. After considerable water was discharged into the 'tween-deck compartment and hold, the vessel took a list and the master ordered the water shut off until the excess water could be pumped out.

Then 42 bottles of carbon dioxide gas were brought from the engine room. Small holes were burned through the steel hatch trunk and the carbon dioxide gas was injected into the 'tween deck. After some time the fire hose was again turned on the fire. The fire was subdued by these means and, after a delay of approximately 10 hours, the vessel proceeded on its voyage.

LOSSES FROM PILFERAGE

Damage caused to cargo by pilferage is extremely widespread and is difficult to prevent. Proper stowage can prevent or diminish it in some cases.

Damage by pilferage is not always heavy as regards the goods actually stolen, but the breaking open of containers often results in serious claims. For example, liquid containers have been broached so as to cause leakage which has seriously damaged other valuable cargo, or delicate and costly instruments and machinery have been ruined by pilferers who have violently broken open cases, searching for easily disposed-of goods.

The losses from pilferage are usually greatest in connection with foodstuffs and liquors, and with small articles of high value such as expensive cloths, lingerie, valuable small instruments and tools, and precious metals or metal plate. But many other sorts of articles are also stolen, such as soap, shoes, and toilet goods, all of which can be easily concealed and easily disposed of for cash.

Precautions that may be taken against pilferage during loading and discharging or while the goods are on the dock include:

The use of special securely-locked spaces for cargo especially liable to pilferage during the time it is on the dock, either before loading or after delivery from the ship and pending delivery to the consignee.

Maintenance of a strict watch by ship's officers in the holds whenever cargo particularly liable to pilferage is being loaded or discharged, or is accessible in the holds while the hatches are off.

Stowage of pilferable cargo, when possible, near the square of the hatch or in the wings opposite the hatch openings, where it can be kept under observation. Avoid stowage of such cargo, if possible, in remote, dark corners of the holds where pilferers may work unobserved.

Provision of an adequate lighting system to illuminate the holds and the pier apron when night work is in progress.

Stowage of other goods on top of pilferable cargo as soon as possible, in order to make the latter inaccessible.

Provision of a sufficient number of reliable relief watchmen to guard the holds during hours when regular watchmen are absent from the ship. Experience has shown that pilferers very frequently take advantage of the regular watchmen's brief but periodic absences to do their work.

Fitting of ventilators leading to compartments containing pilferable cargo with bars or screens, to prevent pilferers using these openings to reach such compartments.

Valuable goods, such as jewelry, are, of course, extremely liable to pilferage, but these are usually given special handling and are carried in the purser's safe or specially provided securely locked compartments.

INSUFFICIENT PACKING

The United States Carriage of Goods by Sea Act, 1936, states that "neither the carrier nor the ship shall be responsible for loss or damage arising or resulting from . . . insufficiency of packing." The act also states that "The carrier shall properly and carefully load, handle, stow, carry, keep, care for, and discharge the goods carried." Thus, the responsibility of providing adequate packing to carry goods undamaged to destination rests squarely with the shipper. The steamship companies have their responsibilities as well, but they cannot be held liable for damage if goods delivered to them for carriage are insufficiently packed. The status of the shipper and the carrier in respect to packing and stowing was further clarified by a decision handed down by the United States Circuit Court of Appeals in March 1940, which is described in chapter I, and to which the reader is referred. Briefly, this decision stated that neither the vessel nor its operator can be held liable if goods offered for shipment are not packed in a manner to withstand the ordinary hazards of an ocean voyage, always providing that the goods are stowed with usual care in accordance with the prevailing practice.

Exporters do not always realize that it is their responsibility to furnish packing that will prove "sufficient" to protect their shipments thoroughly against the usual hazards of ocean transportation. As a consequence, a large amount of damage results from insufficient packing. Some shippers, relying upon their insurance company to pay for damage, lose sight of the fact that if their claim record is poor and they do nothing to improve their packing, they will inevitably be obliged sooner or later to pay higher insurance rates. Meanwhile, their relations with foreign customers will not have been improved by the frequent delivery of broken or unsalable merchandise.

Poor packing is a source of trouble for everyone concerned—the shipper, the consignee, the steamship company, and the insurance company. Every United States exporting company should make certain that its packing is sufficient and of the right kind to deliver its products in good condition. The record of insurance claims will usually reveal whether or not it requires attention. Oftentimes the difference in cost between inadequate packing and good packing

amounts to no more than a few cents per package. One of the worst types of false economy is to use cheap shipping containers which may permit contents to become damaged, when a better container or improved interior packing costing a few cents more will properly protect the shipment.

The subject of export packing to provide protection against breakage, etc., involves consideration of the different types of containers that may be used, as well as different methods of interior packing, and in many cases, as with metal articles and some textile goods, the adoption of some method to prevent the development of rust or mildew. Space does not permit a discussion of these questions in the present volume, but the reader is referred to T. P. S. No. 207, Modern Export Packing, issued by the Bureau of Foreign and Domestic Commerce, and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C. This volume discusses every phase of export packing and should be consulted by shippers who are experiencing difficulty with their ocean shipments.

CHAPTER VIII

DAMAGE FROM TEMPERATURE CHANGES DURING THE VOYAGE

Damage from changes in temperature during the ocean voyage may be classified as damage caused by heat, cold, and sweat or condensed moisture. All these types of damage are closely interrelated, one giving rise to the other or two types (as heat and sweat) occurring simultaneously in the same cargo hold. Much of the damage from these causes is preventable, provided the proper steps are taken by those in charge of stowage and by the master and officers of the ship when pronounced temperature changes are encountered during the voyage.

DAMAGE FROM HEAT

A great amount of damage to certain classes of cargo is caused by the excessive heat encountered on long voyages through or into tropical waters. The damage caused by heat alone is considered here—other damage that may result from heating causing evaporation, sweating, etc., is dealt with later in this chapter.

Moderate heat will damage chocolate, lard, and hardened oils, cheese, syrups, wine, beer, ale, and similar goods. It will also cause wet or damp hygroscopic cargoes, such as green lumber, pulp and paper, grain, seeds, flower bulbs, dry hides, and most other products of plant or animal origin, to release part of their moisture content into the contacting air or cargo in the form of invisible vapor. Such moisture should be removed from the cargo holds by means of ventilation. Otherwise, this moisture may condense on cold cargo or cold inside surfaces of the ship's structure, or may be absorbed by cool hygroscopic cargo. If it condenses to form sweat, it may damage a large quantity of cargo.

Many of the above cargoes, which gave much trouble in the past, are now carried in refrigerator ships or refrigerated compartments.

Numerous commodities, chiefly of vegetable or animal origin, are subject to spontaneous heating, and when this occurs they are likely to deteriorate or rot. Examples of commodities of this type include nuts, beans, cocoa, and pepper, which are liable to heat, sweat, and deteriorate; fine seeds, which may heat and germinate if too moist; hay and wool, which if damp may cause spontaneous combustion; jute and some other fibers, also oilseeds, corn, oats, rice, and other grains—particularly if shipped in an unripe state—which give off a great deal of moisture with resultant sweating, deterioration, and loss of weight. Also tobacco and oil cake, which become moldy and stale when heated; and copra, jelatong, and gambier, which give off heat and moisture and lose weight. Practically all these commodities, by giving off heat and moisture, may imperil other goods stowed in their vicinity.

Certain precautions may be taken in connection with the stowage of goods of this nature to guard against damage to them or to other goods stowed nearby.

Stowage of these commodities, particularly when in bags, in the holds beneath other cargo is to be avoided, since the pressure and insulating effect of the cargo above the bags increases the generation of heat. 'Tween-deck stowage is to be preferred.

Do not stow such goods near the engine or boiler room bulkheads. Where such goods are frequently carried, a valuable practice adopted by some companies is to sheath hot bulkheads or to leave a space between bulkhead or ship's side and cargo through which cool air can be circulated.

Do not stow goods liable to spontaneous heating near wet goods, since the former will increase the evaporation of the liquid contents of the latter, which in turn will accelerate heating of the first commodity.

Pick out cargo to stow near or next to goods of this class, which is not likely to be damaged by the heat, moisture, or sweat produced by the spontaneous heating cargo.

Wet or damp packages of such commodities as beans and nuts should not be accepted for shipment or else should not be loaded until they have been thoroughly dried out. Wet packages of such goods will inevitably heat and deteriorate during the voyage.

Proper ventilation is essential, and this, also, is discussed later in this chapter. In addition, however, to stowing goods liable to dangerous heating in the 'tween decks where air circulates more freely than in the holds, circulation of air around this type of cargo should be assisted by using ample dunnage between tiers. It is equally necessary that the air can freely leave the cargo compartment—a fact which is often overlooked in stowage. The stevedores should provide a continuous air space of at least 6 inches below the weather deck.

In the Eastern trades, cargo likely to heat is frequently stowed on one or more tiers of pipes, rattans, or similar goods. If a large quantity of a single commodity of this type is being loaded in one compartment, it is advisable to break the stowage by interlaying rattans, bamboo, and other light cargo that is suitable and available for this purpose.

DAMAGE FROM CONDENSED MOISTURE OR SWEAT

Moisture damage or sweat damage probably ruins more cargo each year than any other form of ocean-shipping hazard. This is partly because sweat, or condensed moisture, is so prevalent a condition in the ordinary vessel's cargo holds and partly because so many commodities are susceptible to damage by moisture. Textile goods are discolored and mildewed, metals and machinery are rusted, foodstuffs of many sorts are rendered unpalatable, fibers and grains are heated and fermented, woods of some kinds are stained, and many minerals and chemicals are dissolved or changed in chemical composition. Scores of other commodities, too numerous to mention, are likewise susceptible to being damaged by sweat.

Two kinds of sweat are damaging factors—"ship sweat" and "cargo sweat." The former (fig. 52) is caused largely by some part or

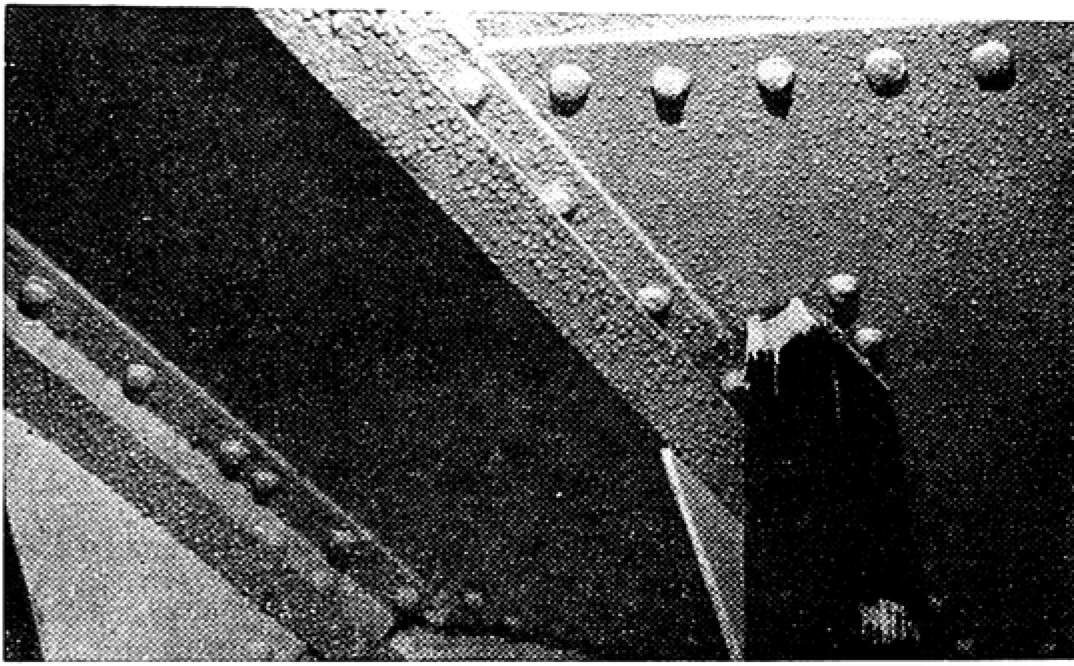

Figure 52.—"Ship sweat" or moisture from air condensing on a cold deckhead.

parts of the cargo heating and giving off water vapor which condenses on the ship's structure. Cargo sweat (fig. 53) is formed by the condensation on cold cargo of moisture carried by the air in the ship's holds.

SOURCES OF MOISTURE, HEAT, AND COLD IN CARGO HOLDS

The factors entering into the formation of sweat are moisture, loss of moisture (as through evaporation), heat, and cold. These causes are closely interrelated and often occur simultaneously in the same

Figure 53.—"Cargo sweat." Moisture from ventilating air condensed on this parcel of black pipe on an intercoastal trip. The pipes became rusty.

hold. Their great danger lies in the fact that they lead readily to other damage, such as spontaneous heating, molding, sprouting, infestation with vermin, crushing, corrosion, tainting, staining, putrefaction, shrinking, and a combination of any of these. Much of this type of damage is preventable, provided the proper steps are taken before, during, and after ocean transit by those who are in charge of stowage and of taking care of the cargoes. For this purpose, a clear understanding of the facts involved, including the sources of moisture, heat, and cold in cargo holds, and the principle of condensation, is necessary.

The condition of the cargo regarding the above types of damage depends greatly on two items: The temperature and moisture condition of the cargo at the time of loading; and the temperature and moisture condition of the air with which the cargo comes in contact from the time of loading until the time it is delivered.

Sources of moisture in cargo holds are: Water vapor in atmospheric air; free moisture in cargo, such as rain, snow, ice, salt water, condensation, etc.; hydroscopic moisture in cargo; moisture in containers and packing materials; rain, snow, or salt water entering the hold through vents, hatches, etc.; and leaks in ship's structure, and steam and water piping systems.

The moisture in the cargo holds from one or more of the above sources may be condensed to form sweat on either ship or cargo by the interaction of heat and cold. It should be noted that the materials used for wrapping, packaging, and dunnaging, such as cardboard, kraft paper, dunnage lumber, box shooks, bags, and matting, form a substantial portion of all cargoes and usually contain much moisture.

Sources of heat in a cargo hold are: Sun radiation, warm atmospheric air, and warm sea water; steam plant of ship, including hot pipes, bulkheads, and decks; and cargo loaded hot or heated spontaneously.

Sources of cold in a cargo hold comprise cold atmospheric air, rain, and snow; cold sea water, including waves, spray, and ice; refrigeration plant, including cold decks, bulkheads, and pipes; and cargo loaded cold.

The condensation of water vapor in atmospheric air to form sweat is discussed later, under the heading "The Principle of Condensation."

FREE MOISTURE IN CARGO

Free moisture may contact cargo in transit from the manufacturing plant to the ship's cargo hold, by way of processing, intentional wetting with the purpose of increasing the weight, or as a result of rain, snow, sea water or condensation. Such moisture is either visible on the surface or is contained within the capillary spaces and pores of the cargo. In inert goods, such as ore, coke, sand, also cotton, wool, and similar goods, free water causes no direct harm. In all seeds and grain— also hay, dry hides, and most goods of animal or plant origin—free water is absorbed and thus causes a multitude of troubles, such as sprouting, spontaneous heating, and molding. On metallic cargoes, such as canned goods, bundles of black or coated steel plate, pipes, wire, and machinery, free water causes corrosion. On sugar, salt, and cement, free water causes caking. On burlap,

tobacco, and lumber products, free water causes stains. Salted hides are an exception, as they are stowed thoroughly wetted with brine and should be kept wet. However, rain, condensation, or sea water will stain them too.

Free moisture in contact with unsaturated air of like temperature tends to evaporate until the air is saturated, or until all free water is evaporated. The lower the relative humidity of the contacting air, the greater its velocity over the wet surface, and the higher its temperature, the faster the free water will evaporate. Hence, if wet cargo is to be dried, provisions in packing, stowage, and dunnaging have to be made to allow an ample quantity of relatively dry and warm air to come in contact with the cargo. The quantity of free moisture in a cargo hold is greatly variable, but is likely to be in the order of several percent of the total weight of cargo in the hold.

HYGROSCOPIC MOISTURE IN CARGO

A gain or loss of hygroscopic moisture, which is combined with the cargo, often affects its characteristics, and may damage it. For example, damp wheat containing 25 percent or more of moisture will actually sprout. With about 17 percent moisture it will merely respire and produce heat, water vapor, and carbon dioxide gas. With decreasing moisture content it is more and more dormant, and with less than 12 percent moisture it can be kept without further precautions in a closed cargo hold, even under varying temperature, for many months without any risk of deterioration or the release or accumulation of harmful amounts of moisture. All seeds respond in a similar manner. Lumber, hides, fibrous goods, paper, and most other hygroscopic goods become tougher and shrink in volume as their content in hygroscopic moisture is reduced. Also mold, infestation with insects, and generation of odors is inhibited in sufficiently dry cargoes.

It follows from the above that a sufficiently dry cargo is always the safest and easiest to carry in ships. Such cargo requires no ventilation at any time, and no special provisions regarding stowage and dunnage. These facts are being recognized and increasing quantities of rice, wheat, seeds, nuts, kiln-dried lumber, spices, etc., are being shipped in sufficiently dry condition. This trend should be encouraged in the national interest, as it prevents loss of raw materials, finished products, and dunnage materials, and also reduces the effort required for taking care of cargoes.

Hygroscopic moisture in cargo—contrary to free moisture—does not tend to completely evaporate when exposed to an ample amount of unsaturated air. Instead, the moisture content of the cargo affects the relative humidity of the contacting air, and also the relative humidity of the air affects the moisture content of the cargo. The final equilibrium obtained depends on the respective weights of cargo and air involved in the process.

The moisture content of a given product in equilibrium with a given relative humidity is called the "equilibrium moisture content," which is expressed as a percentage of the dry weight of that product. Figure 54 shows these relations for a number of commercial products at normal temperature. The equilibrium moisture contents shown decrease slightly with higher temperatures and increase slightly with lower temperatures. A complete moisture equilibrium diagram is

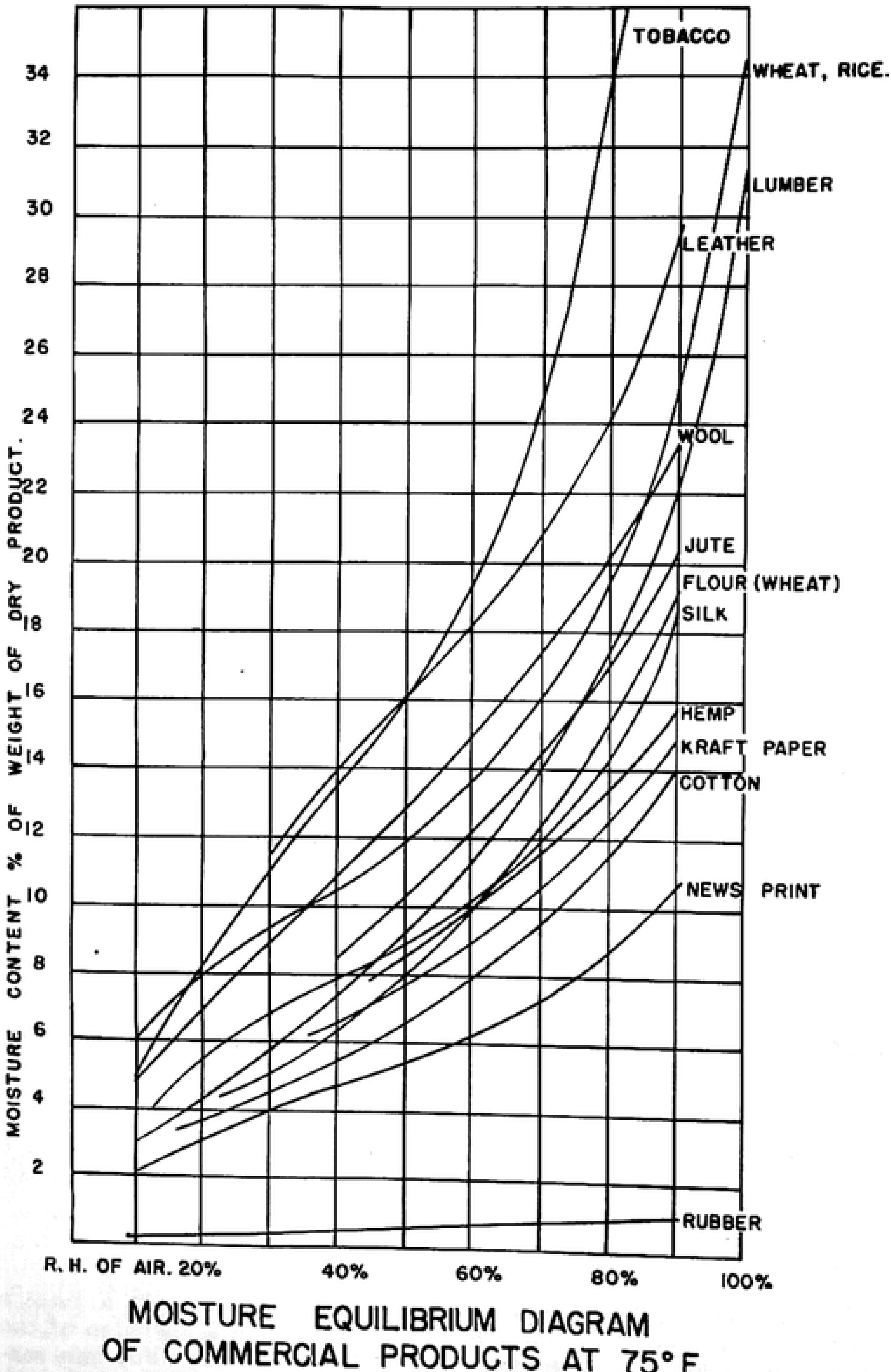

Figure 54.—Moisture equilibrium diagram of commercial products at 75° F.

shown for lumber in figure 55. For the purpose of proper handling of cargo at sea, this chart may also be used with reasonable accuracy for the following products: Wheat, rice, maize, wool, and jute, and will indicate a trend of behavior for all hygroscopic products.

This diagram indicates, for example, that a cargo of wheat containing 14 percent moisture when ventilated with air having more than 70 percent relative humidity at normal temperature will tend to absorb some moisture from the ventilating air, which is undesirable, as was shown previously. On the other hand, if such wheat cargo is ventilated with air having less than 70 percent relative humidity, it will tend to evaporate some moisture into the ventilating air. These processes are well known in other industries, and can also be used on board ship to influence the condition of the cargo.

Figure 55 also indicates that a relatively dry and warm zone of the wheat cargo, for example, near a warm bulkhead, tends to build up

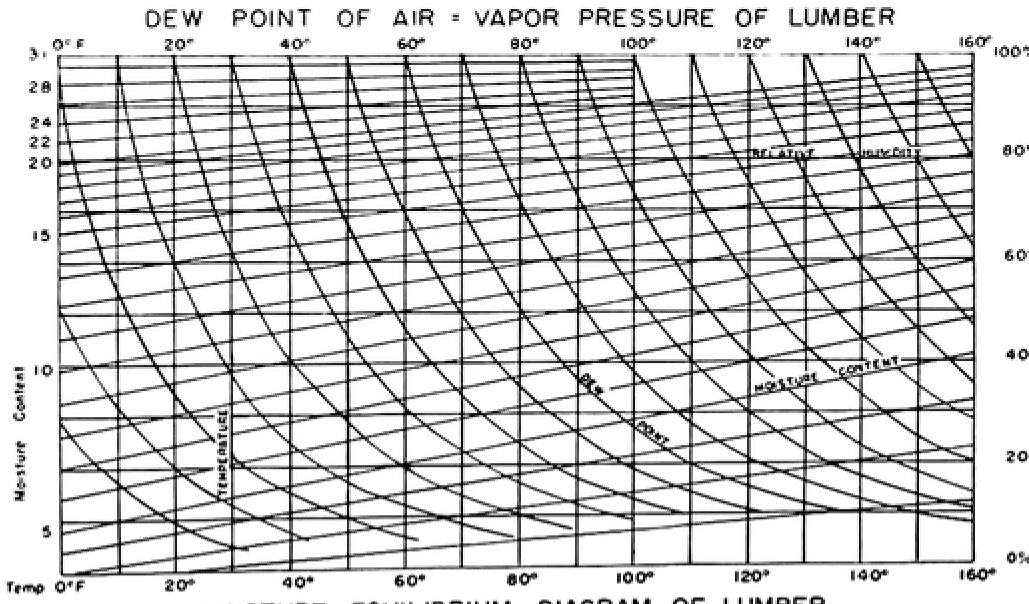

Figure 55.—Moisture equilibrium diagram of lumber.

the moisture content of cooler zones of the same wheat, such as those near the cool sides of the ship, a condition which may cause damage to the cool wheat.

Owing to the fact that cargoes are loaded under many conditions, that moisture transfer of the type discussed above is very slow, and that the temperature through which a ship is traveling is always changing, a never-ending exchange of moisture is taking place in all cargo holds, between cargoes and contacting air.

THE PRINCIPLE OF CONDENSATION

To understand the factors that cause sweat to form in a vessel's cargo hold and on cargo, it is necessary to have a knowledge of the properties of air and of the principle of condensation. For this reason, there is reproduced below a bulletin prepared by the Research Committee on Marine Moisture Damage of the Association of Marine Underwriters of British Columbia. This bulletin gives an admirably

clear description in nontechnical language of the causes of sweat or condensed moisture formation.

General facts regarding air.—The atmospheric air is a mixture of several components of which nitrogen, oxygen, and water vapor are the most important. The volume of air changes with the temperature and may vary between 12 and 15 cubic feet for 1 pound of air.

The amount of water vapor carried in the atmosphere, though entirely invisible, is always considerable. As an illustration, an empty cargo hold of 100,000 cubic feet capacity, i. e., approximately 7,000 pounds of air, contains about 20 pounds of water vapor in freezing weather and as much as 200 pounds in humid, tropical weather. (10 pounds of water equal 1 imperial gallon.)

Air can carry a certain definite amount of moisture (for a given temperature) and no more. This maximum moisture content which is called "saturation" is different for each temperature. (This temperature of saturation is also called the "dew point.")

Relative humidity of air.—It is customary to express the amount of water vapor in the air as a percentage of the amount required to saturate the air at the same temperature and to refer to it as relative humidity.

If air is heated, its relative humidity is reduced because the air can carry more moisture at higher temperatures. On the other hand, if air is cooled its relative humidity is increased (even though no more actual moisture is added to the air).

Dew point and condensation.—When a mixture of air and water vapor is cooled without the removal of any moisture present, it will ultimately become saturated. The temperature at which this occurs is called the "dew point." Any further cooling will cause condensation.

Psychrometric chart.—The relations in air between its temperature, relative humidity, moisture content, and dew point are governed by an exact natural law. Consequently, the condition of a sample of air is defined if two items are known—for example, its temperature and relative humidity. These relations in air are shown in the psychrometric chart shown in figure 56. This chart shows the dew point of air if its temperature and relative humidity are known (or if its wet bulb and dry bulb temperatures are known). The chart also shows the behavior of air when its temperature is suddenly changed.

Deposit of moisture on cold surfaces.—The principle of condensation can be easily studied by observing the deposit of moisture on the outside of a glass containing cold water. The cold glass reduces the temperature of the air near it and raises the relative humidity of that air to 100 percent (if the moisture content of the air is great enough). The water vapor in that air then naturally condenses on the cold glass.

The conditions existing at this time may be briefly analyzed in either of two ways as follows:

The temperature of the cold glass is lower than the *dew point of the air*, or inversely,

The dew point of the air is higher than the temperature of the cold glass.

Condensation such as the above can always be prevented by either of two ways: raise the temperature of the glass above the dew point of the air, or reduce the dew point of the air below the temperature of the glass.

THE PRINCIPLE OF CONDENSATION APPLIED TO A SHIP'S CARGO HOLD

Activity in a cargo hold.—Although the cargo seems to lie idly in the hold, it must be kept in mind that there is a continuous activity going on between the cargoes and the atmosphere. Part of the activity may be visible, such as the condensation of moisture on cold cargo and on the cold metal surfaces of the ship's hold. Part of the activity is invisible, such as the evaporation and absorption of moisture. Besides moisture, chemicals, bacteria, insects, and other destructive forces are at work.

Instruments for tracing the condition of air and the dew point.—The temperature of the air can be obtained with one of many different types of thermometers. The relative humidity can be obtained directly with a relative humidity indicator called a "hygrometer" or indirectly with a wet and dry bulb thermometer called a "psychrometer."

Condensation of moisture on metals, canned goods, and similar cargoes.—The enormous amount of cargo damage from condensation all over the world proves that the effect of ventilation on metal cargoes requires careful study.

If a ship coming from cool regions enters warm regions suddenly, it will be found that, while the atmosphere rises in temperature, cold cargo of the above types in the hold will not warm up rapidly. It remains colder than the dew point of the atmosphere for a long time, perhaps for several weeks. If warm and moist air (of high dew point) is admitted into the hold, it will contact the cold metal cargo on which moisture from the air will rapidly condense.

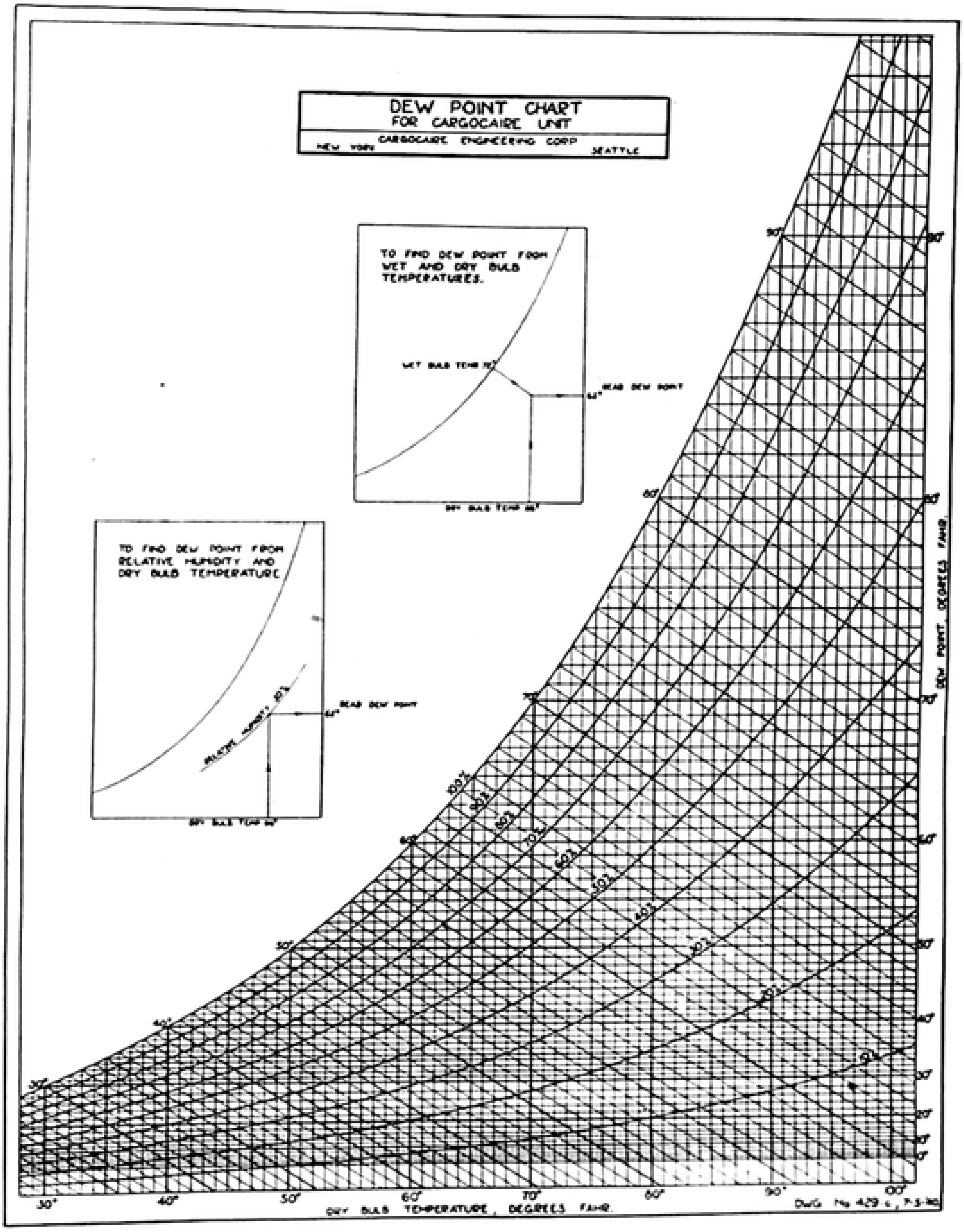

Figure 56.—Psychrometric or "dew point" chart.

As long as the temperature of such cargo is below the dew point of the atmosphere, the admission of warm moist air into the hold must necessarily cause condensation on the cold metal cargoes. After the cargo has become warmer than the atmospheric dew point, the admission of warm moist air into the hold will not produce condensation on metal cargoes (fig. 57).

Reduction of condensation on metals, canned goods, and similar cargoes.—A ship is loaded with metals, canned goods, and similar cargoes in a Northern port. The hatches are battened down and the ship sails southward. After a few days warm weather is approached and the following observations are made: Temperature of outside air, 70°; relative humidity of outside air, 58 percent; dew point of outside air, 55°; temperature of cargo, 60°.

If the dew point of the outside air rises only 6 degrees, the admission of such air into the hold will cause condensation on the cool cargo. (See Fig. 53.)

The question of whether action should be taken before the danger point is reached must be determined by experience. It has been suggested that ventilators should be closed as soon as the dew point of the outside air is about 5 degrees below the temperature of the cargo under consideration and from then on the holds should be kept sealed. As soon as the cargo is about 5 degrees warmer than the dew point of the ventilating air, the principle of condensation indicates that it will be safe again to admit outside air to the cargo under consideration.

If it is not possible to accurately ascertain the temperature of the cargo in question, the only guide is the principle of condensation, plus a knowledge of the temperature of the outside air. If canned goods or metal cargo has been loaded in a cold condition and warm weather is encountered at an early date,

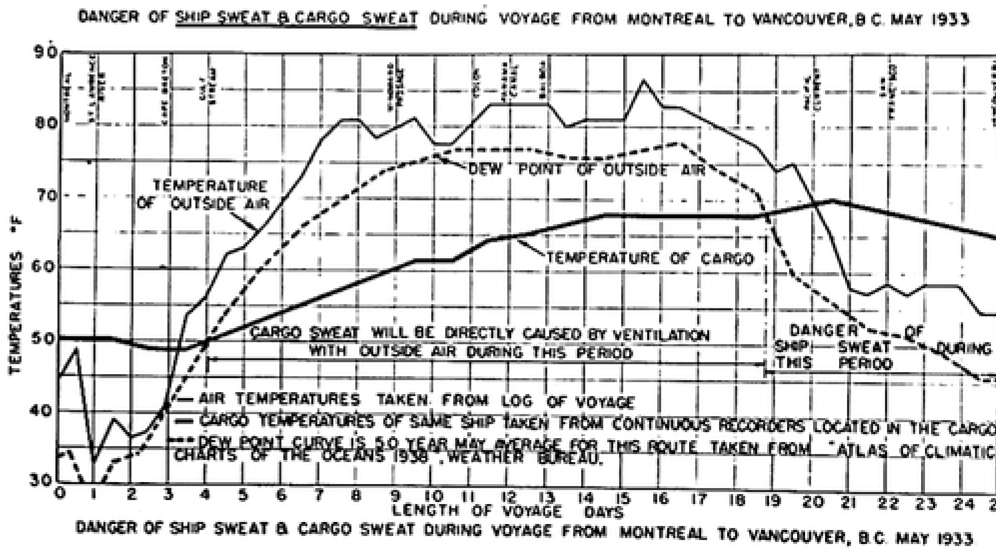

Figure 57.—Record of temperature of cargo and dew point of outside air on intercoastal voyage.

it will be known from the principle of condensation that admitting warm outside air (of high dew point) before the cargo is warmed up will produce condensation.

Mixed cargoes.—From the foregoing it will become evident that cargoes such as metals and canned goods require different treatment in regard to ventilation, as compared with moist grain, fruit, vegetables, odorous cargo, etc., carried in ordinary stowage and which require continuous ventilation.

Condensation of moisture on metal surfaces inside the ship's hold.—A ship coming from the tropics has its hold filled with warm and moist air. In addition to this, the cargo very often is evaporative, i. e., tends to give off a considerable amount of moisture to the ventilating air. If the ship enters cold water or cold weather suddenly, the metal surfaces of the hold will cool off rapidly, because steel is a good conductor. As soon as these surfaces become colder than the dew point of the air in the hold, moisture will condense there. This moisture will collect on the beams and underside of the deck plates from where it will drip back on the cargo. (See Fig. 52.)

The principle of condensation indicates that under the above conditions condensation on metal surfaces inside of the hold will form unless the warm moist air in the hold is carried away.

IMPORTANCE OF DEW POINT

The principle facts of practical value to the ship's officers brought out by the above discussion may be summarized as follows:

The temperature at which air starts to deposit its moisture is called the "dew point" and is the most important single factor to be considered in preventing sweat damage.

Condensation forms when the dew point of entering air is higher than the temperature of the cargo, or

When air is cooled below its dew point, it releases water.

Consequently, outside air with a dew point higher than the temperature of the cargo must not be admitted into the holds. If such air is admitted, the formation of cargo sweat is inevitable.

As soon as a north-bound ship's plating cools down below the dew point of the air in the holds, condensation of moisture from that air will form on the plating and drip onto cargo as ship sweat.

This type of sweat can be eliminated or reduced by ventilation without harm to the cargo, provided the ventilating air is not saturated with moisture and has a dew point lower than the temperature of the ship's metal surfaces.

INSTRUMENTS FOR DETERMINING TEMPERATURE, DEW POINT, AND HUMIDITY

It is clear from the foregoing that the temperature and moisture condition of the cargo at the time of loading and of the air in the atmosphere and cargo hold should be much more carefully watched than has been customary up to now. For this purpose it is strongly recommended that the cargo officer of the ship at the time of loading obtain the moisture content of particularly sensitive goods, such as all grain, seeds, nuts, and their products. This will determine the stowage treatment and amount of care required during the voyage. The condition of the ventilating air, if any, and of the air in the holds near exposed surfaces and within parcels of sensitive cargo should be observed and noted daily.

The temperature of cold steel products, particularly sheets and canned goods, must be watched and taken between parcels daily. The dew point of the air in the hold and of that entering the hold should be watched so that it does not exceed the temperature of the cargo, particularly when the ship leaving cold weather suddenly enters warm weather.

Particularly important are rapid temperature drops of atmosphere and sea water, because they usually badly upset any near-equilibrium that may have obtained in the hold, by making the ship's structure and the cargo near it cold, while most of the cargo is still warm. The results of such conditions are often disastrous to the cargo (fig. 58).

It is necessary, therefore, that the cargo officer have a set of instruments aboard, with the necessary spare parts, which enable him to make tests of heat and moisture conditions in the hold. Very useful for this purpose is a compact, hand-aspirated psychrometer which allows such readings to be taken of the air, even between tightly stowed bales and boxes (figs. 59 and 60).

With the same instrument the temperature of a particular cargo can also be obtained. The moisture content of cargoes can be obtained only by special complicated apparatus not practical for use aboard ship. This information must be requested from the shipper. However, an indication of the moisture content of cargo is given by the relative humidity of *still* air immediately contacting the cargo, and

for this purpose the same hand-aspirated psychrometer mentioned above can be used.

Temperature in the holds may also be ascertained by the use of thermometers, which may be of the direct-reading, glass-stem type, or of the type in which the temperature is recorded or indicated at a distance. A long-distance indicating thermometer may be either

Figure 58.—The bulk corn near this shaft alley ventilator was kept cool. Hence, much moisture originating from heated zone of the bulk cargo was absorbed by the cool grain and condensed on the vent shaft. Much grain was spoiled.

mercury or vapor actuated and consists of a bulb, placed where the temperature measurement is required and connected by means of a flexible armored tube or electric wiring to the dial on which the temperature is indicated by a pointer. In these types of thermometers, the dial may be located at any point convenient for reading. It is considered that there should be at least one long-distance thermometer installed for each block of valuable cargo on which moisture

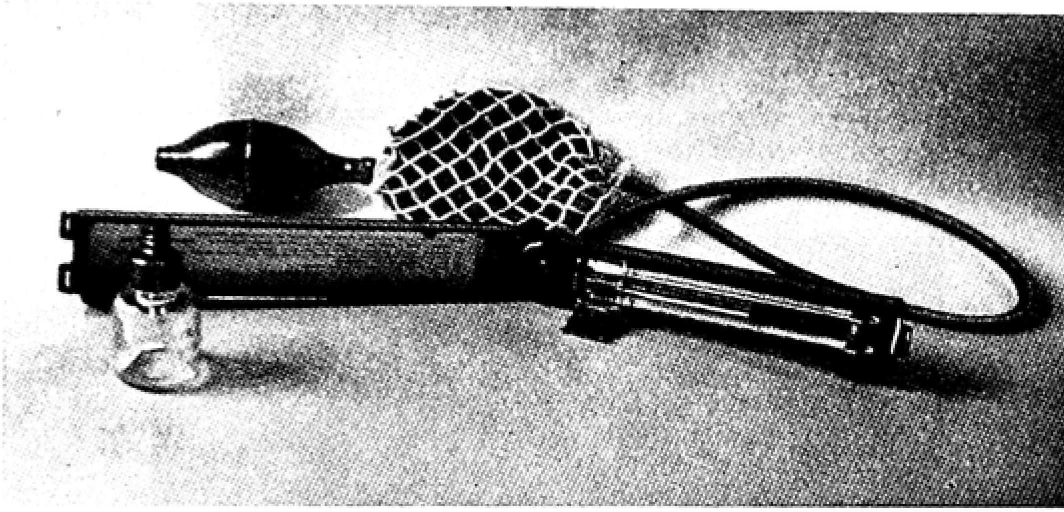

Figure 59.—Hand-aspirated psychrometer.

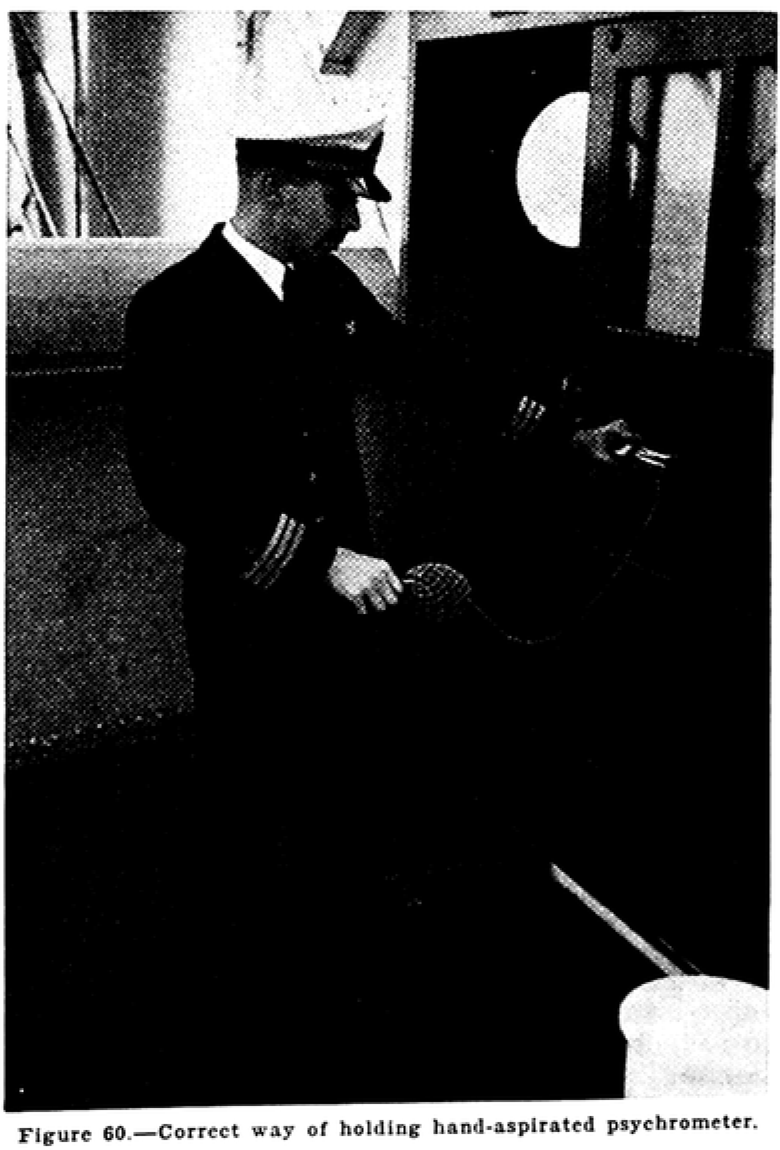

Figure 60.—Correct way of holding hand-aspirated psychrometer.

is likely to condense. The advantage of this type is that the temperature of the hold or cargo can be read on the deck or bridge without the necessity of entering the hold. The bulbs of these instruments should be so placed that they are protected against damage during cargo handling.

Dew point may be measured either by wet and dry bulb thermometers or by a humidity indicator and dry bulb thermometer. Wet and dry bulb thermometers show the wet and dry bulb temperatures. By the use of a psychrometric chart (fig. 56) the dew point can be obtained. Wet and dry bulbs measure the air conditions very accurately, providing there is a brisk movement of air over the wet bulb. Where this air circulation is limited, it is necessary to use mechanical means, such as a hand-aspirator.

By the use of a humidity indicator (instead of the wet and dry bulb thermometer) a direct reading of the relative humidity is obtained. However, before the dew point can be determined from the psychrometric chart the temperature (dry bulb) of the air must be known. For this reason a thermometer must be used in conjunction with the humidity indicator, and consequently these two instruments are often contained in one case.

METHODS OF RECORDING DATA

The method of recording the data obtained will depend upon the type of instrument used. Where recording instruments are used, a continuous record is made by the instrument itself. With indicating types of instruments, however, periodical readings and a form on which to record these readings are necessary. The headings shown in the Cargo Ventilation Log below are suggested for recording the data obtained by use of a long-distance thermometer in the hold and a wet and dry bulb thermometer or humidity indicator and dry bulb thermometer on deck or on the bridge.

Cargo Ventilation Log

[Condensation forms when dew point of entering air is higher than temperature of metal cargo

Date	1 Time	2 Cargo compartment	3 Dry bulb	4 Wet bulb	5 Rel. hum.	6 Dew point	7 Remarks
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....
....	....	....	....	....	....	....	....

NOTES

Column No. 4.—Enter dry bulb and wet bulb readings when using psychrometer.

Column No. 5.—Enter dry bulb and relative humidity readings when using humidity indicator.

Column No. 6.—Plot dew point from No. 3 and either No. 4 or No. 5 on dew point (psychrometric) chart (fig. 56).

Column No. 7.—At start and end of each voyage and at other times whenever necessary note the following: Nature and condition of cargo in each compartment; note free and hygroscopic moisture condition or content of cargo and dunnage material; presence and amount of sweat, if found; stowage of cargo affecting flow of air through holds; exact location of readings taken with reference to cargo, hatch, hull, etc.

PROTECTION OF CARGOES AGAINST SWEAT OR MARINE-MOISTURE DAMAGE

The methods that may be employed to eliminate or reduce cargo damage caused by sweat include: Conditioning of cargo prior to shipment; care in stowage and dunnaging; proper ventilation; and the use of a mechanical dehumidifying installation, such as the "cargocaire" system. Each of these preventive measures is discussed below.

CONDITIONING OF CARGOES BEFORE SHIPMENT

It has been shown that many products, chiefly agricultural, are likely to heat spontaneously and to deteriorate when they contain excessive moisture. Most of these goods, *when sufficiently dry*, could be shipped in a tightly sealed cargo space on long ocean voyages and would not need any ventilation or care whatever. The presence of hot or cold bulkheads or changes in the outside air would not cause a dangerous transfer of moisture under such conditions. Little, if any, moisture would tend to evaporate from the cargo and any excessive moisture in the air of the closed hold would be absorbed by the cargo. Therefore, no condensation could occur in cold weather on the cold metal of the ship.

A logical procedure would be, therefore, to dry all goods likely to heat spontaneously below their safe moisture limits and then carry them to their destination without any protective measures whatever. Obviously such cargoes must not release any harmful odors, and also they must be prevented from taking on any moisture by absorption, rain, or otherwise, after they have been dried and before they are stowed in the ship's hold.

The United States Department of Agriculture and several American steamship companies have made large-scale experiments along these lines with grain and other cargoes, proving that the above statements are correct. In view of this experience, many trades have recognized such procedure as one of the best (if not the only) solution of their troubles, and numerous drying plants for grain, seeds, nuts, and numerous other goods have been built and are being developed in all parts of the world.

The canning industry has had a comparable experience. Experiments made in 1932 by the Forest Products Laboratory at Vancouver, British Columbia, indicated that the box shooks of which the wooden boxes were made should contain less than 17 percent of moisture in order to prevent the rusting of the tin cans during long ocean voyages. As a consequence, the British Columbia lumber and canning industries have been seasoning box shooks, accordingly, and this practice is spreading to other canning centers. S. J. Duly, of London, recently verified these findings. Obviously, the box shooks and filled boxes must not be allowed to absorb moisture before shipment or during the ocean voyage.

The indications are, however, that practical and economic reasons will prevent a rapid growth of such sound practices. A grain drier that may be satisfactory and remunerative in the southern United States is likely to be much too expensive to operate in the interior of the Netherlands Indies or elsewhere. Therefore, it is safe to assume that many producing areas in oversea countries will have to continue

taking chances on the spoilage of their goods, rather than install expensive drying equipment.

Consequently, the ship owner (unless his vessels are equipped with dehumidifying installations) must watch very carefully to make sure that cargoes of the type under discussion are in a safe condition for carriage. It is not enough that the goods are "received in apparent good order and condition" at the ship. As an example, rice may look entirely sound at that time, but its moisture content may be so high that it is certain to deteriorate during a lengthy ocean voyage. The officer receiving the cargo should by all means insist that the moisture content of the dangerous cargo be determined.

STOWAGE AND DUNNAGING

Proper stowage and dunnaging are necessary if the full benefits of proper ventilation are to be secured in reducing or eliminating the formation of sweat. All cargo that requires treatment in the hold because of its condition or because of the presence of sources of moisture, heat, or cold, must be accessible to ventilation. It is, therefore, very important that the cargo be stowed and dunnaged in such a manner that air can freely enter the hold and intimately contact the cargo. It is equally necessary that the air can freely leave the hold after doing its work—a fact which is often overlooked in stowage. The stevedores must provide a continuous air space of at least 6 inches below the weather deck.

Wet, hot, and cold cargo should be stowed with ample dunnage between tiers. The spaces thus created should have access, supply, and exhaust, to the main air streams through the hold by leaving space at two ends of the parcels. The stevedores should keep cargo from contacting exposed sections of the ship's structure by sweat battens, likewise from hot and cold bulkheads or decks. They should further protect it from condensation overhead by covering the cargo with tarpaulins or paper.

VENTILATION

Moisture has been shown to be the most important source of trouble in cargo and in air. The moisture in cargo can be controlled successfully by air of desirable condition. Ordinarily, on most ocean routes and in dry weather, the temperature and relative humidity of the outside air are satisfactory. An ample supply of such air should be distributed through the holds so that the areas of moisture, heat, and cold are well aired. The term "ample supply" means at least two complete changes of air per hour calculated for the empty cargo hold.

For the ordinary cargo vessel, not fitted with the cargocaire system, the following recommendation for ventilating cargo spaces, by S. J. Duly, of the Department of Commercial Products, City of London College, in a paper read before the Royal Society of Arts on January 26, 1938, may be cited:

> Observe the dew point each watch on the bridge, and take the temperature of the cargo once a day. As soon as the dew point rises above the temperature of the cargo, the ventilators should be trimmed back to wind or should be covered and remain in that inactive condition until the dew point falls below the cargo temperature, when they are trimmed so as to ventilate the holds again.

In certain trades the adoption of this practice several years ago has been accompanied by good outturns since. But it is not a generally understood principle at sea, nor is the practice based upon it generally adopted. It involves voluntarily closing the ship's ventilators for sometimes as long as a fortnight, and this proposal does not recommend itself to men whose experience has been that condensation is often the worst when ventilators have been compulsorily closed on account of bad weather.

The observations of other students of marine-moisture damage tend to confirm Mr. Duly's findings. In general, it may be stated, therefore, that when the condition of the atmosphere is unsatisfactory, that is, either too wet or the relative humidity or dew point too high, it is best to keep the holds sealed.

Cold goods, such as steel products and canned goods, loaded at a northern port should not be ventilated with warm, humid air. The present common practice of continuously ventilating steel and canned goods without regard to the dew point of the air and the temperature of the cargo should be discontinued. As long as the temperature of the cargo is below the dew point of the atmosphere, the admission of warm moist air into the hold must necessarily cause condensation on the cold metal cargo. After the cargo has become warmer than the atmospheric dew point, the admission of warm, moist air into the hold will not produce condensation.

When a ship from the Tropics with its hold filled with warm, moist air enters cold water or cold weather suddenly, condensation from the warm air may form on the cold metal surfaces in the cargo holds. Such condensation may form on the beams and underside of the deck plates, even though the temperature of the cargo is above the dew point of the atmosphere. This condensation may be evaporated by ventilation without harm to the cargo, provided the ventilating air is not saturated with moisture and has a dew point lower than the temperature of the metal.

On vessels proceeding from a cold to a warm region the temperature of the cargo should be raised above the dew point prevailing at the port of discharge to which the ship is traveling, so that the cargo will not be damaged by sweat when unloaded on the dock. This is accomplished by providing an ample supply of warm, low dew point air over the surface and through the body of a block of cold cargo. Atmospheric air, with a dew point lower than the temperature of the cargo, is frequently available for this purpose and can be admitted through the ship's ventilators; or such air may be provided by a "cargocaire" system, as explained below. If such air is not available, the hold should be kept sealed tightly to the outside air and natural transfer of heat through hull air and cargo will then slowly warm up the cargo, as the ship travels through hot climates and warm seas.

In connection with this matter, it should be noted that cold decks and bulkheads near refrigerated spaces are undesirable, as they tend to keep the cargo next to them cool. Good insulation and dunnage will reduce this source of trouble.

EXAMPLES OF IMPROPER VENTILATION

Several examples of improper ventilation are cited below to further clarify the principles involved in preventing condensation.

In one very typical case, heavy losses caused by sweat occurred to canned goods shipped from Vancouver to Australia. In the investigation to determine the cause of the damage it was found that the master ventilated the cargo compartments continuously during the entire voyage, believing this was a certain method of preventing sweat damage to canned goods. From a study of the case it became evident that he literally poured warm, moist air on cold canned goods—with the inevitable result that condensation formed.

In another recent instance, a ship's officer on a vessel bound from a northern to a southern port noticed that steel sheets in the hold were covered with condensed moisture. He had his men go into the hold to wipe off the wet sheets. To his surprise the result was nil, and the sheets were soon wet again. He repeated this performance twice, but in vain, the reason being that the sheets were colder than the dew point of the air being admitted through the ventilators. Knowledge of the principle of condensation would have told him that steel sheets are bound to get wet and stay wet as long as they are colder than the dew point of the air.

A third case involved a vessel in which a part cargo of cottonseed was stowed over manganese ore in bulk, the ore being in a more or less damp condition when loaded. The cottonseed generated warmth, which caused moisture in the ore to evaporate, and the resulting vapor condensed on the vessel's sides and under the decks and saturated the holds with sweat. In this case the moist air should have been removed from the holds by thorough ventilation forcing air to pass over the surface of the cargo, possibly by opening the hatches.

In another case, a lower hold of a ship was filled with pitchpine logs which were loaded wet from rafts. It was assumed that these wet logs stowed separately in the lower hold would not harm other cargo. As the vessel proceeded through the Tropics, however, the water in the logs evaporated, and the vapor rose to the 'tween decks and condensed on the under side of the deck. From here it ran down on top of a large consignment of canned goods and rusted the cans and loosened the labels, resulting in a heavy claim. Marine surveyors retained in connection with the damage gave it as their opinion that the damage could have been prevented by permitting the vapor to rise through an open hatch instead of allowing it to condense under the deck.

THE CARGOCAIRE SYSTEM

A new type of equipment, called the "cargocaire" system, has been installed on a large number of recently constructed United States cargo vessels. Briefly stated, cargocaire is a system to reduce the dew point of air in ships' holds by dehumidification to a point at which ship sweat and cargo sweat cannot occur.

The cargocaire installation consists of three units: (1) The dehumidifying unit (fig. 61) located in or near the engine room, which produces large volumes of very dry air; (2) the ventilating and recirculating system, consisting of blowers and ducts for each hold for ventilating with outside air or recirculating the inside air. Dry air from the dehumidifying unit is mixed with this recirculating stream to displace the moist air in the hold; (3) the instrumentation, which gives the deck officers knowledge at all times of the air conditions outside the ship. A quick comparison tells the officers when to change

the cargo-conditioning to anticipate sweat-forming weather conditions.

The operation of the system is as follows: Air from the engine room is drawn through sea-water cooling coils and dried by passage through beds of silica gel, an adsorbent chemical. The treated air is then distributed to the various holds. At certain intervals, depending upon the humidity of the atmospheric air, the silica gel becomes loaded with moisture and must be activated for further service. This is accomplished by blowing air heated by steam coils through the adsorber beds, to dry out the silica gel. To maintain a continuous flow of treated air to the holds, duplicate adsorber beds are installed

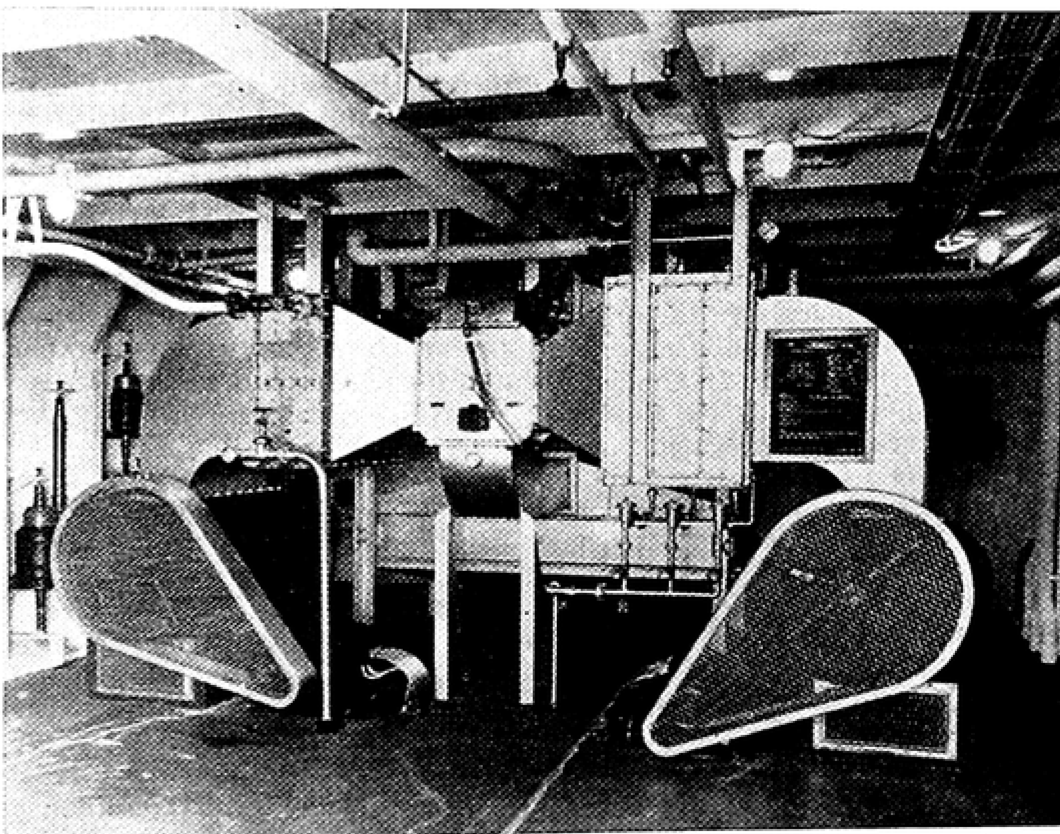

Figure 61.—Cargocaire unit on a United States vessel, showing the blowers, cooler, heater, adsorption beds, and one four-way control valve.

and interconnected with four-way valves. Thus, while one bed is drying air, the other is being activated.

The ventilating and recirculating system consists of duplicate duct systems, one supply and one exhaust, on the forward and after bulkheads of each hold. Each has a single mushroom ventilator above a deckhouse, dampers, an axial-flow fan, a downcomer from the fan, and thwartship ducts at the top of each compartment to lead the air past the heavy girders, which would otherwise stop air flow when cargo is tightly stowed.

This system provides thorough recirculation of air in each hold, independently of weather conditions and with or without the addition of dry air. It also provides ventilation with outside air alone, when it is dry enough, and with outside air mixed with treated air. Owing

to the fact that dry, fresh air is continuously injected into the recirculating air stream, the same amount of air is displaced from the holds, carrying with it excessive moisture, odors, and gases. In this manner, the freshness of the air in the holds and the dew point can be controlled without interference from wind, weather, or atmospheric conditions.

In actual operation, when the outside temperature has a sufficiently low humidity or dew point, it may be circulated in large volumes through the holds. When, however, the dew point outside rises above that in the holds or above the temperatures expected to be encountered within the next few days or at the port of discharge, the outside air is excluded and treated, and dehumidified air is circulated through the holds.

No attempt is made to heat or cool the holds, as the dew point of the air is independent of temperature changes above it, and depends entirely upon moisture content. It would also be impractical to attempt artificial heating or cooling of the holds, as the system is designed for uninsulated holds. Warming of cold cargo is accomplished, however, by the vigorous recirculation of air in each hold—thus borrowing heat from hot decks and warm ocean currents. This is often desirable, so that cargoes can be discharged in a wet, humid climate where the dew point is high. Unless warmed, the cargo might be dry in the hold but start to sweat after discharge.

The instrumentation used in connection with the cargocaire system makes it possible for ship's officers to know accurately at all times the condition of air in each individual hold and also the conditions of the outside temperature. A recorder cabinet (fig. 62) is located in a deckhouse at the exhaust end of each hold. It is connected to each deck level by sampling tubes. A similar cabinet in the charthouse records conditions of the atmosphere surrounding the ship. By referring this information to a special dew point chart (fig. 56) the officer in charge of conditioning cargo can judge the required operation of the equipment and act accordingly. The cargocaire system includes recorders, which provide a continuous ink-record of temperature and relative humidity both in the atmosphere and in the cargo holds. A record of this type, properly annotated and filed away, should be of great value in case of any damage case, as all arguments can be easily settled.

Results obtained by the use of the cargocaire system have been extremely satisfactory, it is reported, and it appears probable that the system will find a wide field of application. Important results have also been obtained in reduction of corrosion and maintenance of the ship's structure through dry conditions. Some ships now in service show distinctly the difference in condition of the structure of holds regularly treated by dehumidification and those which are exposed to the usual sweating conditions encountered at sea.

One of the leading American-flag steamship lines, which was among the first to install cargocaire units on its vessels, states that:

> The cargocaire units were first considered for installation in the new construction program of this company due to the unusual nature of the bulk of the cargo carried by our vessels from the Eastern Mediterranean ports, these being more or less commodities of a vegetable nature or origin, the most important of these being the particularly delicate Turkish tobaccos, which are transported only during the winter months, owing to susceptibility to fermentation in warmer seasons. The greatest danger during this winter season to any cargo is, of course, sweat; and in overcoming this danger the cargocaire system has worked out very satisfactorily.

The first installation of the system was on the S. S. ----------, which sailed for Mediterranean ports on October 5, 1939, with a cargo of grain and cotton. The units were installed in Nos. 2, 3, and 6 holds, and a fan ventilation in the remainder of the holds. On the east-bound outturn good results were obtained and very little sweat was observed. The cargo on the west-bound voyage consisted of tobacco, cellulose, and licorice, all of which are moisture-laden commodities and very susceptible to sweat damage. The three hatches with cargocaire units installed outturned in fine condition (fig. 63), whereas the hatches without the system showed considerable moisture. The vessel

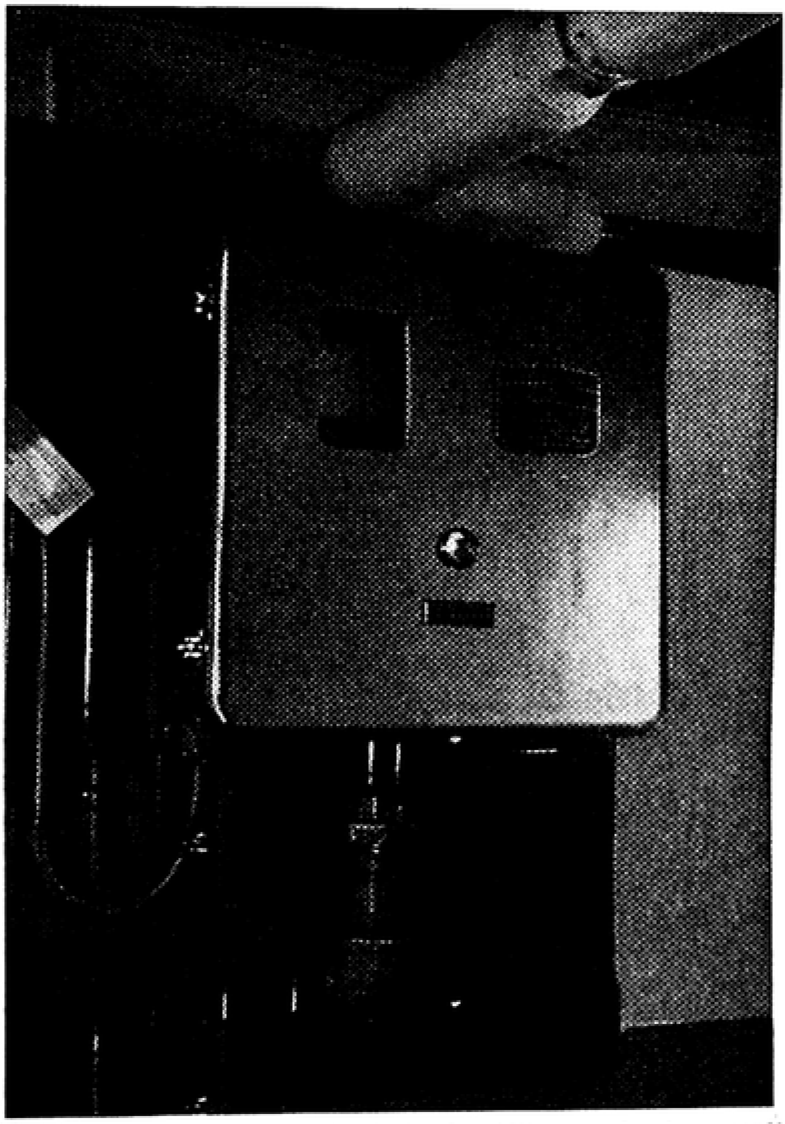

Figure 62.—Cabinet with temperature and relative humidity recorder for recording condition of atmosphere and of air in cargo holds.

arrived in New York on December 1, 1939, which is a time of year when heavy moisture damage has occurred on previous voyages of company vessels.

The second voyage of this vessel was to Indian and Burmese ports with a more or less general cargo. On the return voyage, during which the route around the Cape of Good Hope was traversed homebound, the cargo consisted of hemp, gunnies, tea, rubber, mica, skins, etc., most of which are of vegetable nature and conducive to creation of heat and moisture. The cargo was outturned in particularly satisfactory condition, and this again during the winter months.

Similar results have been obtained on other vessels with this installation. The best results have been obtained when the unit has been used to condition the holds in advance of arrival in localities where changes of temperature are to be

expected. In doing this, the moisture in both cargo and hold has been absorbed, and no sweat damage is therefore liable to occur. Good results have also been obtained in operation of the units after hatches have been closed, and after heavy rain storms in which, through one reason or another, water has collected in the holds. From our operations with cargocaire to the present time, our results have been very satisfactory, and this with cargoes of a more or less particular nature as previously stated.

An official of one of the large tobacco companies, which imports large quantities of Turkish and Greek tobaccos, states that the company's experience with shipments brought in on vessels equipped with the cargocaire system has been most satisfactory. He writes:

We made a very large shipment on the first steamer plying between here and the Eastern Mediterranean that was equipped with this system. We quote from

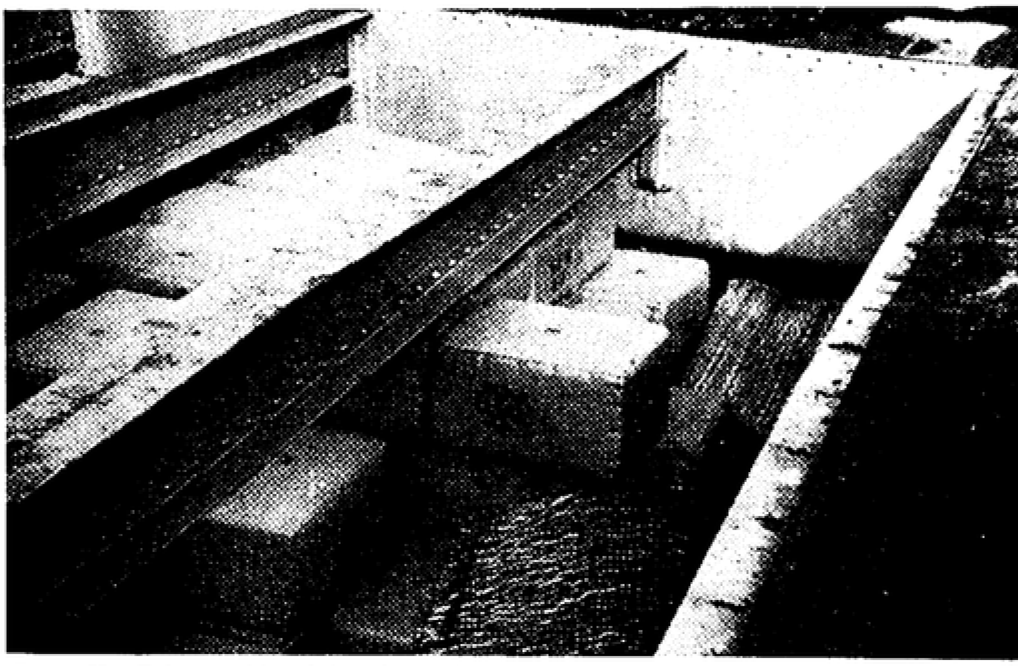

Figure 63.—Tobacco shipped in winter time shows no trace of dripping condensation after proper care and treatment with new ventilating and dehumidifying system. The beams are covered with dust.

report received by this office from the Manager of our Turkish Leaf Storages at Newport News:

"Referring to shipment ex S. S. ---------- that arrived at Newport News on December 6, 1939. We had 17,793 bales of Turkish and Greek tobaccos in this shipment and have just completed and filed survey, by bales, and placed the total shipment in storage. We have notified the insurance company that there will be no claim for marine damage and no labor charge for repairing of any bales in this shipment. There is no question in our minds about controlling steamer sweat with the new installation on this steamer. We were able to even notice dust resting on beams in 'tween deck stowages in which we had tobacco."

The company official concluded his remarks by stating that "the reports on shipments we received on these steamers were the best that we ever received on the condition of cargo on any vessel arriving at Newport News."

CHAPTER IX

STOWAGE OF SPECIAL CARGOES

[NOTE.—A number of regulations of the Board of Underwriters of New York are reprinted in the following pages. It should be understood that, where regulations of the United States Department of Commerce, Bureau of Marine Inspection and Navigation, also stipulate the stowage of the commodity under discussion, nothing in the latter regulations shall be construed as preventing the enforcement of reasonable local regulations, now in effect or hereafter adopted, when such regulations are not inconsistent or in conflict with the provisions of the United States Department of Commerce regulations.]

Consideration is given in this chapter to certain cargoes which usually require special stowage, or the stowage of which is governed to a large extent by special regulations. Where such regulations apply, they are quoted, for ready reference, in the text.

ALCOHOLIC LIQUORS

Alcoholic liquors, such as ale, beer, brandy, liqueurs, whisky, and wines, are shipped in a number of different containers including barrels, hogsheads, and pipes, and are also frequently shipped in bottles packed in wooden or fiberboard cases. The stowage of these liquors depends upon the method of packing.

When shipped in barrels, alcoholic liquors require exceptionally careful barrel stowage. Barrels should be carefully examined when delivered and all leaky, stained, spiled, or damaged barrels should be rejected, or noted.

Beer in barrels or casks should be stowed in cool, well-ventilated spaces, away from engine- and boiler-room bulkheads and from cargo or bunkers liable to heat, since beer deteriorates if heated. Beer may also be damaged by strong fumes or odors such as those of tar, sandalwood, essential oils, or asafetida. Oil or grease in casks should never be stowed over barrels of ale or beer. Sometimes, in vessels passing through the Tropics, a small porous plug is inserted through the bung of beer barrels in the cargo. This is done to prevent the barrels' bursting when the beer becomes heated. If plugs of this type are used, cargo underneath the beer must be protected against any liquid that may seep out.

Bottled beer in cases requires ordinary stowage for case goods but should be stowed in a special locker if possible to prevent pilferage. Cool stowage is essential, and bottled beer should not be stowed among articles that might be damaged if any of the bottles should burst—which frequently happens.

Most wines are carried in casks which, according to their capacities, are called tuns, pipes, or butts, puncheons, hogsheads, tierces, or barrels. The number of gallons of wine per container varies according to the country of export and type of wine. The measures in general use are given in the section, Weights and Measures Used in Shipping.

Careful barrel stowage is required for wines to prevent damage from leakage, which is frequently quite heavy. Much leakage results from the use of old containers, and all leaky, spiled, partially empty or otherwise damaged containers should be noted, and either rejected or receipted for with qualifications stating the condition of the container when received. It is recommended that bills of lading covering wine shipments should protect the ship from liability for leakage, ullage, and spills. Wine deteriorates from heat and is injured by strong odors, so stowage should be arranged to guard against these dangers.

Wine in bottles, whisky, and other valuable and tempting alcoholic liquors should, if possible, be stowed in a special locker to prevent pilferage. When being loaded or discharged, there should be a reliable watchman in the hold at all times.

As a further deterrent to pilferage, many freight tariffs contain a clause similar to the following: "Shipments of wines, liquors, etc., in packages, will not be accepted for transportation unless the packages said to contain such goods are protected by approved clips, metal straps or wires secured by lead seals at the ends, or some equally effective device."

COAL AND COKE

Coal is generally carried in bulk by tramp vessels, and certain precautions should be observed in connection with its stowage in order to reduce the danger of spontaneous ignition, shifting or clogging the ship's pumps.

Coal gives off marsh gas, an inflammable gas, particularly when recently broken or immediately after loading. This gas, when mixed with air, may explode if brought into contact with a spark or light. Coal also heats, leading to the danger of spontaneous ignition, owing to its absorption of oxygen from the air. Such absorption is greater at high temperature, as when passing through tropical zones.

Before loading a coal cargo, the bilges should be inspected to see that the rose boxes are all clear and that all limber boards are properly fitted so that small coal will not get into the bilges and possibly clog the pumps.

The following precautions against coal cargoes heating and catching on fire should be observed:

When loading, the first coal to go in the ship should not be broken, since coal is more liable to ignite spontaneously if it has recently been broken. This is not always possible with modern loading appliances, but in some cases loaded cars can be lowered quite far down into the hold before being tipped. Where this method is used, the first few cars should be lowered as far into the hold as possible.

Provision should be made for temperatures to be taken at the bottom of each hold and at the ends of each hold so any undue rise in temperature can be immediately detected. Temperatures should be taken at frequent regular intervals during the voyage.

Surface ventilation is absolutely necessary and often should be continuous. Some authorities recommend that there should be not less than two large ventilators at each end of every hold in which coal is carried. In addition to this ventilation, the hatches should be opened in fine weather, and particularly during the early part of the voyage, to facilitate the escape of gas.

It may be noted that there is no additional risk of fire if coal is shipped in a wet condition. Coal shipped in a wet condition will sometimes outturn as much as 3 percent less in weight. Bills of lading should cover the ship against claims for short delivery arising from this cause.

When loading coal, it is usually advisable to put as much coal as possible in the center hatches and then, while this is being trimmed, to load a certain amount in the end hatches. The center hatches should then be completed and the vessel afterwards trimmed to its load line by the end hatches. This minimizes strain on the vessel's hull.

Frequently the end hatches are not loaded full, as the ship will be down to its marks before they are completely filled. There is some danger of the coal shifting in these partially filled spaces. It has been recommended that, after the coal has been trimmed and leveled off in such a compartment, several tiers of boards with 8-inch space between the boards should be placed on top of the load.

Rules of the Board of Underwriters of New York governing the loading and carriage of coal are given later in this chapter.

MEASURES TO PREVENT FIRES IN COAL CARGOES

The United States Department of the Interior conducted a study of the causes and remedies of fires in steamship bunker and cargo coal which was published in 1923.[1] In its summary of suggestions and recommendations it brought out the following information.

The danger of loss of life or of total loss or damage to vessels from coal carried in bunkers or as cargo is sufficient to warrant great care in choosing, handling, and watching coal placed in ships.

Information is lacking on the spontaneous combustion of coal on ships, and it is very desirable that accurate data be gathered and studied for the benefit of the shipping industry.

Many kinds of bituminous coal have been transported on ships without spontaneous combustion developing; on the other hand, spontaneous combustion probably has developed in all varieties of bituminous coal carried in ships. There is undoubtedly a difference in liability to spontaneous combustion with different coals, but the data available at this time do not permit a classification of coal to be made upon this basis. Hence, when a choice is possible, a coal that has been shown by its past record to be particularly liable to spontaneous combustion should not be put on a ship. If the choice is not possible, and coal with a bad history must be used, especial care should be taken in stowing and watching it.

As spontaneous combustion is due mainly to the oxidation of fine coal, liability to spontaneous combustion is greatly reduced if fine coal and dust can be removed by screening, but this is not usually practicable with present coaling methods and because run-of-mine coal is generally furnished to ships, particularly at American ports, both for cargo and bunker purposes. This requires that extra precautions be taken. The least friable of the coals available should be chosen, if possible, and care used in handling the coal to minimize breakage and crushing.

Although it is known that sulfur in coal in the form of pyrites is not the chief cause of spontaneous combustion—as was formerly supposed, and still held to be the case by many—pyritic sulfur may be a contributing cause, owing to the heat produced in its oxidation and the fact that the oxidation of the pyrites breaks up the lumps of coal. It is wise, therefore, to select a low-sulfur coal, if possible; but it must not be taken for granted that a low-sulfur coal will be free from spontaneous combustion. It should also be remem-

[1] Stoeck, H. H. Fires in Steamship Bunker and Cargo Coal. Technical Paper No. 326. Bureau of Mines, U. S. Department of Interior. 1923.

bered that a considerable amount of the total sulfur, so far as known, has no effect on spontaneous combustion.

The evidence in regard to the chemical action of moisture in coal in aiding or retarding spontaneous combustion is very contradictory, although experiments in France and New South Wales show that coal thoroughly drenched with water when placed in a bin did not heat, whereas similar coal, similarly placed in a dry bin, heated quickly. As vessels must usually be coaled promptly, no attention can be paid to weather conditions, and it seems to make little difference as to the tendency to fire whether coal is loaded in wet or dry weather.

Practice and opinions vary widely in regard to the ventilation of bunkers and holds. Many advocate keeping the coal spaces as nearly airtight as possible by battening down the hatches, but others advocate taking off the hatch covers when weather conditions permit, to provide surface ventilation. Adequate ventilation throughout a coal cargo by pipes or by ventilating chimneys of coarse coal through the pile, as is advocated by some, is impracticable. It seems better to distribute the coal uniformly and to prevent as far as possible segregation of the sizes, as such segregation tends to set up air currents throughout the mass of coal. Moist air circulating through a coal pile seems to lower its temperature of ignition. Ventilating funnels should be provided in connection with bunkers and holds to carry off the explosive gases given off by many coals, and great care should be observed in opening a bunker or hold that has been tightly closed to test for explosive gases. Open lights should be prohibited in closed spaces where coal is stored.

When coal is loaded, trim it if possible in horizontal layers to avoid separation of the sizes, rather than dump it in a cone and thus permit large lumps to roll to the bottom of the cone and the fine coal to collect near the top of the pile, just under the hatches, where fires are often known to start.

Thoroughly clean out bunkers and holds before fresh coal is put in, and closely inspect coal as it is being loaded, removing from it any waste in pieces of wood, paper, or similar combustible material which might assist spontaneous combustion.

The mixture of different kinds of coal, or the placing of fresh coal in old coal that has been in the bunkers for some time, is generally considered unwise. Although there is no scientific explanation for this, in the absence of evidence to the contrary it is wise not to mix coals, if mixing can be avoided. Many advocate using the coal in the order in which it is placed on shipboard, although this is contrary to the experience of land storage—that coal gradually seasons and becomes less liable to spontaneous combustion.

Keep the coal as cool as possible. and avoid placing it in contact with outside sources of heat, such as steam pipes and hot air ducts. Protect bunkers from the heat of boilers and engines.

Take the temperature of the coal at regular intervals, the oftener the better, if there is any tendency to heat. If the temperature reaches 100 degrees F. and is rising rapidly, move the coal and cool it off by contact with air, steam, or, in extreme cases, water. If water is used, burn the coal as soon as possible, and keep it separate from the other coal, as the application of water to hot coal breaks it up and by thus exposing fresh surfaces renders it liable to spontaneous combustion.

Provide an adequate steam supply, hose, pumps, and other fire-fighting equipment, and always keep them ready for use.

Some automatic fire-detecting apparatus in the pilot house or engine room is advisable.

Provide for the egress, before men enter places where coal is kept, of explosive and other gases that are given off by coal, and avoid open lights in cargo and bunker spaces. Clean the vents leading from bunker and cargo spaces after coal has been put in place.

Clean out thoroughly, when the ship goes out of commission, all spaces where coal has been kept, as fine coal left in corners and on ledges frequently fires.

Do not run electric wiring, unless in metal conduits through spaces in which coal is placed. Use every precaution to prevent sparking at electric contacts.

The British Board of Trade through its Mercantile Marine Department issued a notice in 1930 containing recommendations for avoiding or checking the spread of coal fires on shipboard. The

bulletin was intended for shipowners, masters, and engineers and the recommendations are based on the results of the investigation into the causes of bunker and cargo coal fires which was made during 1929 by the Department of Scientific and Industrial Research.

The notice issued by the Department reads:

The Board of Trade has had its attention called to a number of serious fires which occurred in 1929 on ships engaged on long distance voyages, resulting in two cases of total loss, and, as a result of consideration given to these cases by its technical advisers, it recommends that the following precautions be taken:

Before ships carrying coal on long voyages are loaded, the holds should be well swept and the sparring and cargo battens removed if practicable.

The ventilators to the lower holds should be so arranged that they may be opened or closed at will during the voyage.

For the first 5 days after loading, the ventilators should be utilized for removing gas; thereafter the ventilators to the lower holds should be plugged except for about 6 hours every 2 days.

As the critical temperature at which the process of spontaneous heating in coal becomes greatly accelerated is in some varieties of coal as low as 100 degrees F., and generally is not much higher, the need for keeping the exterior surface of the hull, and thereby the interior of the 'tween decks and holds, as cool as possible is manifest. For example, one ship carrying coal had its iron decks covered with dunnage to lessen heating in the Tropics.

Suitable means should be provided for ascertaining from time to time the temperature of the lower mass of coal, particularly below the hatchways, and this might be done by means of two pipes leading down to the bottom of the coal at each hatchway. The temperature tubes should have closed ends to prevent the admission of air into the cargo. The temperature of the coal at three heights should be taken daily.

The employment of the crew in chipping and painting below decks during the voyage should be avoided. The danger from smoking, or from oily waste being left below, where it can become ignited by spontaneous heating, are factors that should not be lost sight of.

On arrival at the port of discharge the hold ventilators should be unplugged and the lower hold well ventilated before commencing to work cargo.

A smoke helmet fitted with a long air tube, or self-contained type requiring no air pump, would be useful in enabling investigation of the conditions in the holds to be made.

HINTS TO MASTERS ON THE CARRIAGE OF COAL

(From Lloyd's Calendar, 1932)

It should be remembered in connection with the carriage of coal that the master is responsible for the proper ventilation of the cargo, and any fault through this neglect will react upon him.

As cargoes loaded in wet weather will lose from 2½ to 3 percent of their weight, the necessary excess weight on the bill of lading weight should be insisted upon under these conditions, otherwise the cargo will be delivered short of the called-for amount.

Where coal is loaded in a lower hold, partly filled, stout shifting boards should be fitted at the midship stanchions. Great care must also be taken with the limbers and the pump wells, all chance of clogging must be guarded against.

Temperature.—A pipe with a perforated end, preferably two of them, should be let down into the body of the coal and thermometers lowered each watch and temperature recorded. Coal absorbs twice its own volume of oxygen in 10 days, and this is most rapid on a freshly broken surface.

Coal dust.—Special care should be taken to prevent the damage of other cargo by coal dust. After a hold has been used for coal, special care should be taken in cleaning it for the next cargo. The bilges should be completely free from the dust.

Never close up ventilators leading to a coal hold to keep down the dust.

Never enter a coal hatch with an open light.

Uptakes.—The heels of steel masts and king posts, sometimes fitted with a ventilating uptake, should be closed before stowing coal. Every possible

point of uptake should be stopped off. Where H section hold pillars are fitted see that no dunnage boards are in place about them, forming possible flues from the bottom of the coal cargo.

REGULATIONS OF THE BOARD OF UNDERWRITERS OF NEW YORK

The regulations issued by the Board of Underwriters of New York in connection with the carriage of coal and coke are given below:

CARRYING OF COALS ON DECK DURING THE WINTER MONTHS, OCTOBER 1 TO APRIL 1

Coal may be carried on deck of steamers when the following precautions are observed.

Not more than 10 percent of the net tonnage of the vessel to be carried on deck.

The coal bunker space under deck is in no case to be curtailed; steamer must carry enough coal under deck to assure passage to destination.

Coal on deck to be secured and properly trimmed in both ends of vessel.

Steering gear to be kept free and properly protected.

Stability of vessel to be preserved, and the allotted loading draft not to be exceeded.

All the above conditions to be subject to the approval of the Master of vessel.

SECURING OF DECK LOAD OF COKE

(1) Stanchions of 6 inches by 4 inches of 14 feet to 16 feet in length spaced 4 feet apart. One-inch boards 1 foot apart inside the stanchions. Double chicken wire inside the 1-inch boards to be brought up and over the coke entirely enclosing same. Wire lashings to be set up over the double wire. All winches to be protected by tarpaulins or bins and sounding pipes to be kept clear by wooden frames.

(2) An alternative method can be used, if desired, as follows: Using stanchions of the same dimensions as above, then using 1-inch boards secured to the stanchions 1 to 2 inches apart in place of the chicken wire with 1-inch boards laid over the coke set up with wire lashings.

N. B.—When loading coke in bulk, care should be taken to see that all bilges are protected to prevent the entrance of fine coke dust.

RULES FOR CARRYING OF COAL ON COAL-LADEN STEAMERS

Anthracite.—Steamers with 'tween decks loading anthracite coal should have shifting boards from deck to deck secured or lashed to the stanchions with not more than 8-inch space between the tiers of boards. Steamers with single decks and the holds full of anthracite coal should have shifting boards secured or lashed to the stanchions 6 feet down from the deck with not more than 8-inch space between the tiers of boards.

In such holds or decks as are not filled with anthracite coal there should be at least four tiers of boards with 8-inch space between the boards, the top shifting board to be at least a foot above the coal. The coal should be trimmed and leveled in all compartments.

Soft or Bituminous Coal.—Should be trimmed and leveled in all hatches and compartments.

All coal-laden steamers should have hatches on and tarpaulined before leaving the port of loading. The hatches must be secured by means of hatch locking bars or cross-lashed with wire or good rope over the hatches, set up with screws or other effective means, to ringbolts or cleats, with suitable chafing pieces to prevent cutting of tarpaulins.

COTTON

Cotton is an important cargo in international trade and is carried in full cargo and smaller lots from the United States, Brazil, India, Peru, Egypt, China, Australia, Turkey, Greece, and to a minor extent from a few other regions.

In stowing cotton, two factors require consideration: Stowing so as to get the largest possible number of bales in the ship (fig. 64), and guarding against the danger of fire either during loading or during the voyage.

Before loading a cotton cargo the holds should be carefully measured, and measuring should be repeated during the loading operation to ascertain how many heights will fit in the hold, so that the bales can be stowed on their flat edge or end in order to insure the holds being completely filled and the largest possible number of bales being stowed. The old method of screwing cotton into a vessel is seldom used today. The large cubic capacity of many modern cargo

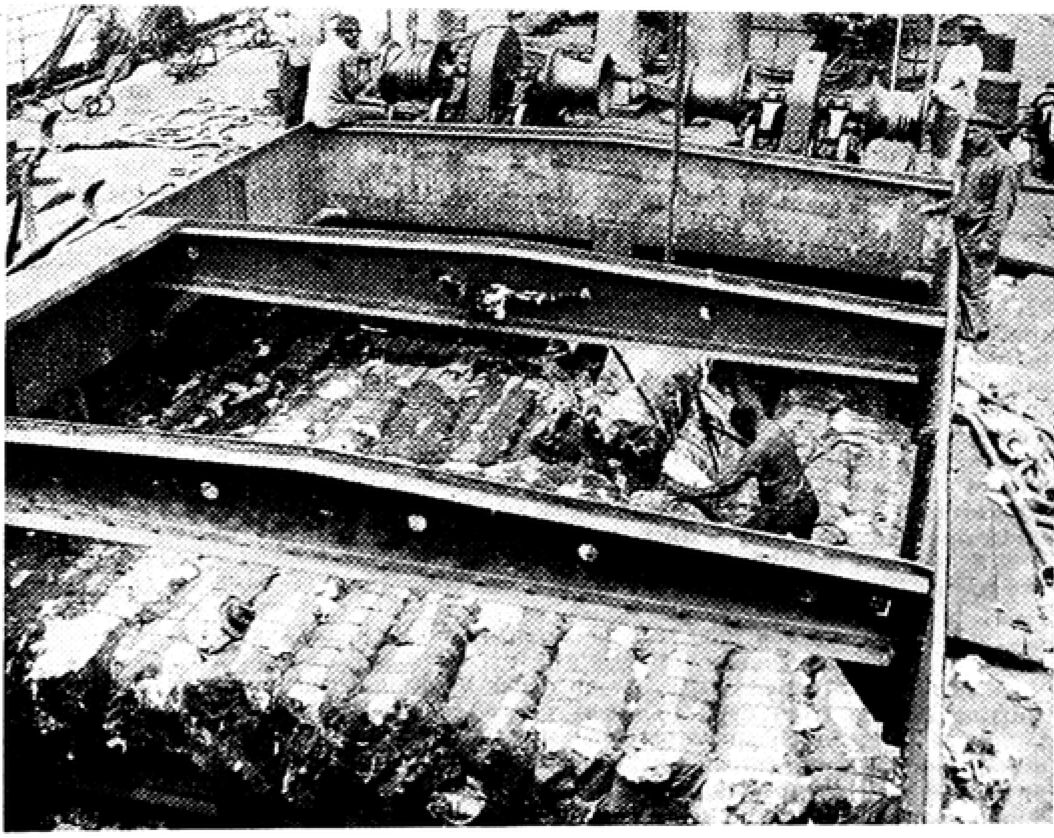

Figure 64.—Cotton stowage.

vessels and the hydraulic pressing of bales to high density have rendered this practice less necessary than in former days.

Adequate dunnage and mats should be used, and all iron parts in the holds of the vessel should be well covered with burlap or mats.

PRECAUTIONS AGAINST FIRE

Every vessel carrying cotton should be equipped with either steam or chemical fire extinguishers, and these should be thoroughly inspected and overhauled before commencing to receive the cargo.

While loading or discharging cotton, the fire hoses should be ready for immediate use and water barrels and buckets should be at hand near the hatches. "No Smoking" notices should be posted, and ship's officers should rigidly enforce this order. All galley funnels should

be covered with gauze or other suitable material to prevent sparks reaching the cargo.

Cotton bales which are or have been in contact with oil or grease are very liable to spontaneous combustion. For this reason cotton should never be loaded in holds which have recently been painted, or the spar ceilings of which have recently been painted, unless it is certain that the paint has thoroughly dried and hardened. For the same reason, cotton bales should not be stowed close to any oily or greasy goods.

Wet cotton bales are not liable to spontaneous combustion, although this was for many years believed to be the case. Such bales will, however, heat and deteriorate if stowed in a confined space, and it is recommended that all wet or damp bales, as well as those with torn wrappers and missing bands or marks, be refused.

During the voyage it is advisable to have all the ventilators covered with wire gauze to prevent carelessly thrown matches from entering the cargo holds and possibly starting a very serious fire.

The Board of Underwriters of New York has issued rules governing the loading of cotton at all United States ports, also regulations governing the loading of cotton with other hazardous commodities, such as rosin, turpentine, and lubricating oil. These are given below and can be used as a reliable guide to good practice when cotton is being loaded at other ports which have no specific rules.

HINTS TO MASTERS OF COTTON-LADEN STEAMERS[a]

(*From Lloyd's Calendar, 1928*)

If any painting of holds has been done on the outward voyage, or in port while waiting for cargo, it is most desirable to see, before taking in cotton, that the paint is thoroughly dry and hardened, as any contact of cotton with oily substances is very dangerous, and likely to lead to fire breaking out if the temperature be at all high.

Should a fire declare itself at sea, there is no doubt that steam will hold it in check, and hitherto, in numberless cases, it has enabled vessels with serious fires on board to arrive safely at their port of destination, both in the United Kingdom and Continent.

It is recommended, on the first alarm, to batten down and close all apertures, and then to turn on steam from the injectors into the affected holds.

If, however, the steamer be wanting in these most necessary fittings for a cotton carrier, it is suggested that the engineers should break the connection of a winch-pipe or pipes and turn on steam. Should the decks be steel or iron, and consequently difficult to cut through, cut the wooden hatch-cover, and direct your steam through this aperture—the steam, if possible, to be the full pressure from the main boiler.

If the ventilators lead only into the 'tween decks, they are readily available for the purpose of injection; but should they lead into lower holds, with an aperture for each deck, they are not so useful, as they have a tendency to condense the steam and prevent its diffusion. Of course, it is to be understood that the ventilators are thoroughly plugged, with only an aperture left sufficient to admit of the steam injection pipe, *if used*.

Keep the steam going continuously. The decks and shell plating will get very hot, which sometimes causes the opinion that the fire is extending; but captains must recollect the higher temperature of the steam, and that the decks and plating must necessarily get hot. Masters should not, under these circumstances, cool the decks with water or apply water at the same time as steam, such a course only causing the steam to condense on its entering the hold, and entirely nullifying the action of injecting steam—in fact, fans any fire that may exist by the vacuum thus created causing a draught.

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[a] Prepared by the late James Maccabe, Esq., Cargo Surveyor, Liverpool.

If the seat of the fire is in the 'tween decks, steam will readily fill the space. In the lower hold there is a larger condensing surface, and matters are rendered more difficult. Where possible, steam should be applied below the fire, e. g., by piercing the engine-room bulkhead, and directing a jet into a lower hold or 'tween decks, as the case may be.

When grain is carried below cotton it is well—indeed, in any case, it is advisable—to put some extra fastenings on the hatch or hatches of the holds into which steam is being poured in great volume.

With regard to assertions as to liability of cotton to spontaneous combustion, 20 years experience of the carriage on and under deck of saturated cotton has entirely disproved any such fears.

It is true, in carrying wet cotton under deck without any special precautions, and keeping it wet, the bales will heat very much, and so injure the fiber or staple, but they will not ignite.

Dr. Dupre, the Chemical Adviser to the Government, after a series of experiments, came to the conclusion that cotton unless oiled, and then subjected to a *very high* temperature, was not liable to ignition by spontaneous combustion.

As to damage to health of officers and crew in carrying a cargo of wet cotton, even under hatches, the groundlessness of this supposition has been shown by the numerous instances in which such cargoes have been brought forward to European ports, in one instance from the Red Sea in summer, without any ill effects arising therefrom.

REGULATIONS OF THE BOARD OF UNDERWRITERS OF NEW YORK

LOADING COTTON WITH HAZARDOUS CARGO

Cotton and Coal (Bunker)

Cotton and coal should not be carried in the same compartment.

In case a steamer has two or more decks, cotton and coal may be carried in adjoining compartments in the lower holds, if these compartments are separated by a steel bulkhead.

Coal may be carried in the 'tween deck of a two-deck steamer over cotton in the lower hold, provided the hatches are properly secured and tarpaulined.

Cotton and coal may be carried in the 'tween deck of a two-deck steamer, provided a 2-inch wood bulkhead is constructed to separate these two commodities. It is also required that the coal side of the bulkhead is to be covered with sheet asbestos and to be protected with suitable metal sheathing.

Coal may be carried in the bridge deck over cotton in the 'tween decks and lower hold, provided the hatches are properly secured and tarpaulined.

Coal and cotton may be carried in the bridge deck, providing the same precautions are taken as outlined above, where coal and cotton are carried in the 'tween decks.

Loading of Cotton in the 'Tween Decks or Shelter Deck Over Coal in the Lower Hold or Lower Decks

Cotton may be carried in 'tween decks or shelter deck over coal in lower hold, or lower decks, after coal has been properly stowed. Coal compartments must be properly ventilated, and the hatches over the coal must be properly secured and tarpaulined.

Coal may be loaded in lower holds and/or lower decks after cotton has been loaded in 'tween decks, or shelter deck, provided a tight, coal-dust proof wooden trunkway is erected in the deck, or decks, containing cotton, and is so constructed that it can be taken down, and the hatches over the compartments containing coal properly secured and tarpaulined. The coal compartments must be ventilated to the satisfaction of the surveyor.

This stowage will be permitted on all steamers excepting those bound to China, Japan, Australia, and New Zealand. In these trades, the 'tween-deck and/or upper-deck hatches separating coal and cotton must be properly secured and tarpaulined and protected with asbestos and metal before cotton is loaded over the coal.

Cotton and Coke, Petroleum Coke, Tar, and Asphaltum

Cotton should be carried in separate holds, from any of these commodities, whenever it is practicable to carry out such stowage.

Cotton may also be carried in the lower hold with any of these commodities in the 'tween deck, provided 'tween-deck hatches are properly secured and tarpaulined. If cotton is carried over any of these commodities in the same hold, the precaution must be taken to completely cover these commodities with a sufficient covering of 1-inch boards before the cotton is stowed over either of them.

Cotton may also be carried on the same level, in the 'tween decks only, with these commodities if separated by a 2-inch wood bulkhead made dust-proof.

The Loading of Cotton and Gasoline, Naphthalene, Turpentine Substitute, Alcohol, Acetone, Potassium and Sodium Sulfides, and Nitrate of Soda

In the case of single or duble deck steamers, cotton must not be carried in the same hold or compartment with any of these commodities. Whenever practicable, these commodities should be stowed in holds separated from cotton by two iron or steel bulkheads or engine-room space. If this is not practicable, then the cotton must be separated from these commodities by one iron or steel bulkhead.

In the case of shelter-deck steamers carrying cotton and any of these commodities, they must be so stowed that the space in which gasoline or other of the commodities is carried is completely separated from the space in which cotton is carried, by a steel bulkhead continuing to the shelter deck. In the event, however, that the steamer is not fitted with such continuous steel bulkhead in the shelter deck, the stowage of cotton and gasoline or other of these commodities will be permitted in adjacent holds and decks if a 2-inch wooden bulkhead sheathed with asbestos and sheet metal on the gasoline side is constructed in the shelter deck in lieu of such continuous steel bulkhead, in a manner approved by the surveyor, at a distance of 5 feet abaft the steel bulkhead separating gasoline, etc., and cotton below, if the gasoline and other commodities are in the forward end of the steamer, and at a distance of 5 feet forward of the steel bulkhead separating gasoline, etc., and the cotton below, if the gasoline and other commodities are in the after end of the steamer, but in no event will the stowage of gasoline or other like commodities be permitted in the shelter deck where this deck has only this temporary bulkhead.

Cotton, however, may be carried in the shelter deck on the further side of this bulkhead away from the gasoline, or other of these commodities which are stowed in the decks or holds below. Only one such bulkhead is to be constructed, and gasoline or other of these commodities is to be carried in one end of the steamer only.

Stowage of Synthetic Nitrate of Soda and Cotton

Synthetic nitrate of soda, as manufactured in the United States of America, may be carried in the lower hold or decks with cotton in the deck or decks ABOVE, or may be carried in a deck with cotton in the hold or decks BELOW, provided that the deck separating these two commodities shall be of steel and the hatches in place.

The hatch should be covered with sheet asbestos, properly secured and tarpaulined to protect the asbestos.

Cotton and Kerosene (having a fire test of not less than 150° or a flash point of not less than 120°)

Cotton may be carried in shelter or upper deck with kerosene in the lower hold or may be carried in a 'tween deck over kerosene, providing the hatches are properly secured and tarpaulined, separating cotton and kerosene.

Lubricating Oil in Decks Over Cotton Stowed in Holds Below

Lubricating oil in good barrels or drums may be carried in a steamer's 'tween decks over cotton stowed in the lower hold or deck below, provided the deck is tight, has coaming with cleats, and scuppers. The quantity should be limited

to 250 barrels or drums, and these are to be stowed in one end of the deck against the bulkhead, tiered, and at least 3 feet from the hatch coamings.

In a steamer where the deck is tight, low coamings without cleats and with scuppers, 100 barrels, or drums, will be permitted in the 'tween deck over cotton in the hold or deck below in one end of the deck tiered and at least 6 feet from the hatch coamings.

In permitting this stowage consideration must be given to the shear of the steamer's deck. Therefore, the oil must be stowed in the low end of the deck. The oil should be securely chocked off and the hatches properly secured and tarpaulined, and in no event are more than two compartments to be used in any steamer for this stowage.

In no circumstances must animal or vegetable oils be stowed in a 'tween deck over cotton in the hold.

Lubricating Oil in Drums in the Shelter Deck Over Cotton Stowed in the 'Tween Deck

A vessel can carry mineral lubricating oil in the shelter deck, provided the scuppers where the oil is carried are kept clear for any drainage overside. If any other dry cargo is carried in the shelter deck a passageway should be left to clear the scuppers if required. The hatches in the shelter deck should be tarpaulined and no oil allowed over the hatches.

If cotton is carried in the shelter deck care must be exercised that oil cannot reach the cotton, proper dunnage being used to effect this purpose.

Lubricating Oil in Drums on the Same Level With Cotton in the Lower Hold

Lubricating oil in drums will be allowed on the same level with cotton when these two commodities are loaded in the lower hold of motor and steam vessels.

Mineral oil in drums can be stowed five high if the drums are 18 gage; any lower gage, seven high.

There should be a separation of at least 3 feet between the cotton and oil, the separation to be of lumber, or machinery, or similar cargo.

The dunnage of lumber under the cotton should be raised to the level of the bilge drainage.

Cotton and Lubricating Oil, Cottonseed Oil, Bean Oil, or Similar Oils

Cotton and lubricating oil, cottonseed oil, bean or similar oils, should be carried in separate holds whenever it is practicable to carry out such stowage. If this is not practicable, then the stowage should be left to the discretion of the surveyor of the Board, who will require that, if cotton is carried over lubricating oil, cottonseed oil, bean oil, or similar oils in the same hold, the necessary precaution will be taken to completely cover the lubricating oil, cottonseed oil, bean oil, or similar oils with sufficient dunnage and a *tight floor of two-inch dunnage boards* before the cotton is placed on top.

Loading of Cotton and Turpentine or Turpentine Oil With a Flash Point of Not Less Than 90° Fahrenheit

Cotton must not be carried in the same compartment or hold with turpentine, but turpentine may be stowed in the fore part of the bridge deck of a steamer with cotton below, providing the hatch over the cotton can be properly secured and tarpaulined and covered with asbestos and metal. No turpentine should be allowed over the hatch.

In the case of a shelter deck steamer, or a steamer with a continuous open deck with no steel bulkhead in such deck, cotton and turpentine may be stowed in the adjoining holds and decks below, providing a steel bulkhead separates these commodities. The hatch over the turpentine must be properly secured and tarpaulined.

If turpentine is stowed in the after end of the steamer, cotton may be carried in the open deck or shelter deck above, provided a 2-inch wooden bulkhead, sheathed with asbestos and metal on the turpentine side, is constructed on the open, or shelter deck, 5 feet forward of the steel bulkhead forming the forward end of the hold in which the turpentine is stowed, and the cotton is stowed forward of this temporary bulkhead. The hatch over the turpentine must be properly secured and tarpaulined.

If the turpentine is stowed in the forward end of the steamer, the 2-inch bulkhead, sheathed with asbestos and metal on the turpentine side, is to be constructed 5 feet abaft the steel bulkhead forming the after end of the hold in which the turpentine is stowed. The hatch over the turpentine must be properly secured and tarpaulined.

If no cotton, but general cargo such as logs, lumber, rosin, autos, or machinery, is carried on this open or shelter-deck space, then the hatches over the holds containing turpentine in such open or shelter deck must be properly secured and tarpaulined.

Cotton and Sulfuric Acid, Nitric Acid, Hydrofluoric Acid, Chromic Acid, Muriatic Acid, Hydrochloric Acid

Requires on-deck stowage.

Cotton and Phosphate Rock

Cotton may be carried in the same compartment, over phosphate rock, with proper separation.

Cotton and Dynamite, Powder, and Other Explosives

These commodities should never be stowed in the same hatch with cotton, but must be stowed in a properly constructed magazine erected in opposite end of ship from that in which cotton is stowed.

Cotton, Cotton Sweepings, and Cotton Waste, Only

Requires on-deck stowage.

Cotton Wastes, Mill and Oily Sweepings

Cotton waste, mill sweepings, and similar materials free of oil can be stowed under deck provided it is properly baled and covered with bagging.

Any of these commodities containing not more than 5 percent by weight of animal, vegetable, or mineral oils, if properly baled may be stowed in any deck or hold providing ordinary cotton is not stowed in the same deck or hold. These commodities may also be stowed in the forward end of a bridge deck, or the after part of a shelter deck separated from ordinary cotton. They may be stowed in the fore or after peaks, forecastle, or poop.

In motor vessels, they may be stowed in the bridge deck.

Cotton waste, mill, and oil sweepings containing more than 5 percent of mineral oil only requires on-deck stowage.

Cotton waste, mill, and oily sweepings containing more than 5 percent of vegetable or animal oil is prohibited.

Cotton, Fire Damaged

Cotton previously damaged by fire should not be stowed under deck or with inflammable or combustible commodities. This class of cotton requires on-deck stowage and should not be covered or stowed on top of hatches except with special permission of the Board.

Cotton, Wet

Cotton that has been wet should not be stowed in contact with clean, dry cotton, but separated by proper dunnage, or in the 'tween deck with cotton in the lower hold.

Stowage of Reconditioned Burnt Cotton Pickings

Assorted burnt, scorched, and discolored cotton pickings, which have been air or steam dried and re-baled with standard bagging and ties to a density not less than is customary for merchantable lint cotton, should be stowed in the same manner as specified for "Cotton, wet," namely, not in contact with clean, dry cotton, but separated by proper dunnage, or in the 'tween deck with cotton in lower hold.

Each bale should have a clean piece of bagging 2 feet square compressed with the bales, reading "Burnt cotton pickings."

Cotton and Sulfur

These commodities may be carried in the same hold, provided they are separated by a tight wood bulkhead, thwartships, same to be dustproof.

Cotton may be carried in the same hold *over* sulfur, provided the sulfur has been trimmed and leveled and the hold thoroughly cleaned of sulfur dust. A tight floor of two 1-inch crossed clean dunnage boards must be laid on the sulfur before cotton is loaded.

Steamer's representatives on discharging cotton with this stowage should take the precaution of discharging the ground tier of cotton from the ends and wings of the hold, leaving the ground tier in the square of the hatch until all other cotton has been discharged.

Cotton and Rosin

These two commodities should be carried in separate holds whenever it is practicable to carry out such stowage. Cotton may be carried in the lower hold the rosin in the 'tween deck, provided the 'tween-deck hatches are properly secured and tarpaulined. If it is not practicable to stow as above, then the stowage should be left to the judgment of the surveyor of the Board, who will see that if cotton is carried over rosin in the same hold, the necessary precaution will be taken to completely cover the rosin with a tight floor of two 1-inch boards before the cotton is stowed over the rosin. If a small quantity of rosin is carried in one end of the hold, the rosin is to be leveled and well covered with dunnage and save-alls before cotton is loaded.

General Rules for Stowage of Cotton

All ships carrying cotton shall have 'tween-deck hatches properly put on, tarpaulined, and secured.

Ships, motor or steam, shall be equipped with a fire-smothering system approved by the Board of Underwriters of New York, connected in all holds and space where cotton is carried.

Ships while loading cotton shall comply with the requirements of the Cotton Underwriters and the Port Authorities with regard to fire protection.

If hoisting engines are being used for bunkering purposes while loading cotton, the smokestack of such hoisting engine must be effectively screened to the satisfaction of the surveyor; otherwise, hatches must be put on until bunkering is completed.

Stowage of Cotton Over Wet Logs or Lumber

Due to recent claims to cotton by sweat caused by cotton being stowed over wet logs or lumber, our surveyors are advised that when cotton is stowed over wet logs or lumber, no beam fillings of cotton should be allowed, thereby permitting circulation of air. It is also suggested that the vessel's personnel be advised that ventilation is essential in connection with this storage.

DANGEROUS GOODS

The carriage of explosives and other articles or substances, and combustible liquids on board vessels is regulated in the United States by the United States Department of Commerce, Bureau of Marine Inspection and Navigation. Its regulations, which define, describe, name and classify explosives or other dangerous articles or substances, and combustible liquids most commonly carried by water, are contained in the publication "Explosives or Other Dangerous Articles on Board Vessels," which can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The cost of this publication is $1.

These regulations became effective on April 9, 1941. Previously, common carrier cargo vessels were subject to a modified extension of the rail regulations applying to dangerous articles and passenger vessels were subject to the provisions of the United States statutes, rulings of the Bureau of Marine Inspection and Navigation, regulations of the Supervising Inspectors, and the modified extension of the rail regulations. Stowage was recommendatory and was left to a large extent to the judgment of the individual steamship companies. The stowage of certain dangerous articles has been, and still is, influenced by rules established by private organizations, especially the Board of Underwriters of New York. The most important regulations issued by this organization are given later in this chapter. British regulations have an important bearing on cargoes bound to different parts of the British Empire. Excerpts from these are included in this chapter, and the reader is referred for further detailed information to the provisions of the British Merchant Shipping Act of 1894, and the publication entitled "Carriage of Dangerous Goods and Explosives in Ships," which in many respects is similar to the regulations of the United States Department of Commerce, Bureau of Marine Inspection and Navigation.

Excerpts from the new regulations of the United States Department of Commerce are also included in this chapter in order to indicate their general scope and content. Shipowners and operators, ship masters, shippers, and all others engaged in the preparation and transportation of explosives and other dangerous articles or substances, and combustible liquids should obtain copies of the complete regulations.

In the section on "Commodities and Their Stowage," the principal dangerous articles included in these regulations are listed alphabetically, with the notation "See Dangerous Goods." This notation means that those interested should consult the regulations for detailed guidance as to packing and stowage.

PARTIAL LIST OF UNITED STATES DEPARTMENT OF COMMERCE REGULATIONS

Transportation of Explosives and Other Dangerous Articles

Purpose of regulations.—The purpose of these regulations is to promote safety in the handling, stowage, storage, and transportation of explosives or other dangerous articles or substances, and combustible liquids, as defined herein, on board vessels on any navigable waters within the limits of the jurisdiction of the United States including its territories and possessions excepting only the Panama Canal Zone and the Philippine Islands, and to make more effective the provisions of the International Convention for Safety of Life at Sea, 1929, relative to the carriage of dangerous goods.

Source of regulations.—The Secretary of Commerce shall by regulation define, describe, name, and classify all explosives or other dangerous articles or substances, and combustible liquids and shall establish such regulations as may be necessary to make effective the purpose intended.

Classifications.—Explosives or other dangerous articles or substances, and combustible liquids are classified in these regulations according to their principal characteristics and properties as follows: Explosives—Dangerous explosives, class A; less dangerous explosives, class B; relatively safe explosives, class C. Inflammable liquids. Inflammable solids and oxidizing materials. Corrosive liquids. Compressed gases. Poisons—Extremely dangerous poison, class A; less dangerous poisons, class B; tear gases or irritating substances, class C. Combustible liquids. Hazardous articles.

Changes in regulations.—Changes in regulations usually result from the development of new information, altered conditions, improvement in manufacture,

or modernized commercial practices. Proposals for changes will be considered by the Secretary of Commerce on his own motion or upon a request submitted by any carrier interest, by industry, or other interested party.

Inflammable or combustible liquids in bulk.—Nothing in these regulations shall be construed as affecting the transportation of inflammable or combustible liquids in bulk, such transportation being governed by the regulations promulgated under the provisions of section 4417a of the Revised Statutes, as amended (46 U. S. C. 391a).

Supersedes existing rulings.—All rulings in existence on the effective date of these regulations (April 9, 1941) regarding transportation, packing, marking, labeling, or stowage, as cargo, of explosives or other dangerous articles or substances, and combustible liquids, on board vessels as promulgated by the office of the Director of the Bureau of Marine Inspection and Navigation are superseded by these regulations; except nothing in this provision shall be construed as affecting the transportation of inflammable or combustible liquids in bulk under the provisions of section 4417a of the Revised Statutes, as amended (46 U. S. C. 391a).

Supersedes existing regulations.—General rules and regulations in existence on the effective date of these regulations regarding the transportation, packing, or stowage, as cargo, on board passenger vessels of hay, straw, baled cotton, baled hemp, or other inflammable material, and refined petroleum having a flash point of not less than 110° F., lubricating oils, kerosene, or other illuminating oils as promulgated by the Board of Supervising Inspectors of the Bureau of Marine Inspection and Navigation are superseded by these regulations.

Other requirements under title 52.—Nothing contained in these regulations shall be construed as relieving any vessel subject to the provisions of these regulations from any other of the requirements of title 52 (secs. 4399 to 4500, inclusive) of the Revised Statutes or acts amendatory or supplementary thereto and regulations thereunder applicable to such vessel, which are not inconsistent herewith.

Local regulations.—Nothing in these regulations shall be construed as preventing the enforcement of reasonable local regulations, now in effect or hereafter adopted, when such regulations are not inconsistent or in conflict with the provisions of these regulations.

Application to vessels.—These regulations apply to all vessels, domestic or foreign, regardless of character, tonnage, size, service, and whether self-propelled or not, whether arriving or departing, or under way, moored, anchored, aground, or while in drydock to the extent and in the manner indicated herein.

(a) These regulations shall not apply to any public vessel which is not engaged in commercial service.

(b) These regulations shall not apply to any vessel subject to the provisions of R. S. 4417a, as amended, which is constructed or converted for the principal purpose of carrying inflammable or combustible liquid cargo in bulk in its own tanks, except such vessel shall be subject to the provisions of R. S. 4472, as amended, with respect to explosives prohibited to be transported, stored, or stowed on board any vessel.

(c) Regulations with respect to explosives prohibited by subsection 3, of R. S. 4472, as amended, apply to all vessels.

(d) Regulations with respect to the transportation, storage, or stowage of high explosives on board passenger vessels apply to all vessels defined as "passenger vessels" in Section 146.03-36. (This definition is given immediately below.)

Passenger-carrying vessels or passenger vessels:

> (1) A passenger-carrying vessel or a passenger vessel is any vessel which carries passengers; provided that no vessel of the following classes shall be considered a passenger-carrying vessel or a passenger vessel:
>
> (*i*) Any vessel subject to any of the provisions of the International Convention for Safety of Life at Sea, 1929, which neither carries nor is authorized to carry more than 12 passengers.
>
> (*ii*) Any cargo vessel documented under the laws of the United States and not subject to that Convention which neithers carries nor is authorized to carry more than 16 persons in addition to the crew.
>
> (*iii*) Any cargo vessel of any foreign nation that extends reciprocal privileges and not subject to that Convention which neither carries nor is authorized to carry more than 16 persons in addition to the crew.

(2) Any passenger vessel that is not designed and built to receive railroad vehicles shall be considered a passenger ferry if it is engaged in a ferry operation.

(3) Any passenger vessel that is designed and built to receive railroad vehicles shall be considered a railroad-car ferry.

(e) Regulations with respect to the transportation, storage or stowage of high explosives on board vessels, other than passenger-carrying vessels, apply to all vessels defined as "barges" or "cargo vessels" in section 146.03–36. These definitions are as follows:

Barge: Any non-self-propelled vessel having no passengers on board, shall be considered a barge.

Cargo vessel: (1) Any vessel other than a passenger vessel or a barge shall be considered a cargo vessel. (2) Any passenger ferry or railroad-car ferry shall be considered a cargo vessel during any period it is being operated under authority of a change of character certificate issued by a Board of Local Inspectors.

(f) Regulations with respect to the transportation, storage or stowage of explosives (other than high explosives) or other dangerous articles or substances apply to all vessels, except vessels specifically exempted from such regulations by the provisions of R. S. 4472, as amended, or vessels that are, or may be, specifically exempted by these regulations.

Vessels specifically exempted by R. S. 4472, as amended, are: (1) Vessels not exceeding fifteen (15) gross tons when not engaged in carrying passengers for hire; (2) vessels used exclusively for pleasure; (3) vessels not exceeding five hundred (500) gross tons while engaged in the fisheries; (4) tugs or towing vessels, except as to fire prevention and extinguishing requirements provided for by subsection 6 (b) (4) of R. S. 4472, as amended; (5) cable vessels, dredges, elevator vessels, fireboats, ice-breakers, rock drills, pile drivers, pilot boats, welding vessels, salvage and wrecking vessels.

(g) Inflammable or combustible liquid cargo in bulk is also exempt from these regulations: Provided, however, that the handling and stowage of such liquid cargo in bulk, on board vessels to which these regulations may apply, shall be subject to the provisions of section 4417a of the Revised Statutes, as amended.

(h) Regulations with respect to the transportation, storage, or stowage of combustible liquids packed in barrels, drums, or other packages apply only to passenger vessels.

Application to shippers.—Regulations with respect to definitions, descriptive name, shipping name, packing, marking, authorized containers, labeling, and certification of shipments of explosives or other dangerous articles or substances, and combustible liquids, apply to all shippers offering such articles or substances for transportation or storage on board vessels to which these regulations apply.

Application to others.—The provisions of these regulations,, insofar as applicable to them respectively, are binding upon owners, charterers, agents, masters, or persons in charge of vessels subject to these regulations and upon all other persons transporting, carrying, conveying, handling, storing or stowing on board such vessels any explosives or other dangerous articles or substances, and combustible liquids.

Compliance.—The applicable provisions of these regulations shall be observed by:

(a) All vessels, domestic or foreign, subject to these regulations, and the owners, charterers, agents, masters or persons in charge of such vessels;

(b) Railway or highway carriers and their operators, owners, agents, or representatives when vehicles operated by such carriers and loaded with explosives or other dangerous articles or substances, and combustible liquids, are offered for transportation or enter on board a vessel;

(c) All shippers, their agents or other persons offering explosives or other dangerous articles or substances, and combustible liquids, for transportation on board vessels;

(d) All persons engaged in the acceptance, handling, stowage, storage or transportation of explosives or other dangerous articles or substances, and combustible liquids on board vessels;

(e) All shippers or carriers of explosives or other dangerous articles or substances, and combustible liquids shall instruct their employees relative to the provisions of these regulations.

Enforcement.—(a) The provisions of R. S. 4472, as amended, and the regulations prescribed herein, shall be enforced primarily by the Bureau of Marine Inspection and Navigation, Department of Commerce, and the Coast Guard of the Department of the Treasury. Enforcement officers may at any time and at any place within the jurisdiction of the United States board any vessel for the purpose of enforcing the provisions of these regulations.

(b) An officer of the Coast Guard designated by the Secretary of the Treasury as captain of the port, or to perform the duties of the captain of the port, is hereby empowered to enforce these regulations. If the captain of the port, or the officer designated to perform the duties of the captain of the port, finds that any explosives or other dangerous articles or substances, and combustible liquids are being handled, stored, stowed, carried or transported in violation of the statute or of these regulations such officer may stop such operation or require such corrective action as he may deem necessary to effect the purposes of the statute and compliance with the regulations.

(c) Any collector of customs may, when possessing knowledge that a vessel is violating any provisions of the statute or regulations established thereunder, by written order served on the master, person in charge of such vessel, or the owner or charterer thereof, or the agent of the owner or charterer, detain such vessel until such time as the provisions of the statute and these regulations have been complied with. The master, person in charge, or owner or charterer, or the agent of the owner or charterer of a vessel so detained may, within 5 days, appeal to the Secretary of Commerce who may, after investigation, affirm, set aside, or modify the order of the collector.

Military or naval forces.—The provisions of these regulations shall not be construed to prevent the transportation of military or naval forces with their accompanying munitions of war and stores.

United States War and Navy Department shipments.—Shipments of explosives or other dangerous articles or substances by, for, or to the War or Navy Departments of the United States Government shall be packed, including limitations of weight, in accordance with the Interstate Commerce Commission regulations for the transportation of explosives or other dangerous articles in effect at time of shipment, unless special packing is required by specific directions of the War or Navy Departments. Such shipments may be accepted for transportation under either method of packing.

Canadian shipments.—Shipments of explosives or other dangerous articles or substances, as defined herein, which are packed, marked, and labeled in conformity with the regulations of the Board of Transport Commissioners for Canada, may be accepted and transported on board vessels within the navigable waters of the United States provided their acceptance and stowage on board the vessel is in accordance with these regulations for the substances involved, and provided further that the bill of lading or other shipping paper carries the certifying statement of the shipper that the goods are packed, marked, and labeled in accordance with the regulations of the Board of Transport Commissioners for Canada.

Export shipments.—Shipments to a foreign country may be accepted for transportation when packed, marked, labeled, and described in accordance with the regulations of the country of destination. The bill of lading or other shipping paper shall identify such shipments by the shipping name shown in these regulations for the particular substance and also shall certify that the packing, marking, and labeling is in accordance with the foreign regulations, and identify by title or otherwise such foreign regulations. Markings on export packages may be in the language of the country of destination. Labels as prescribed in these regulations shall be affixed or printed or stamped upon such export packages when offered for transportation in lots of one hundred (100) or less packages. Stowage on board a vessel shall be in accordance with these regulations as applicable to the particular character of vessel.

Import shipments.—(a) Import shipments of explosives or other dangerous articles destined upon arrival at domestic ports for further transportation in original containers by common carrier by rail or by common or contract carrier by motor vehicle shall comply with the Interstate Commerce Commission regulations for the transportation of explosives and other dangerous articles in effect at the time of shipment. The importer shall furnish with the order to the foreign shipper, and also to the forwarding agent at the port of entry, full and complete information as to packing, marking, labeling, and other requirements as prescribed by the Interstate Commerce Commission regulations.

(b) Import shipments of explosives and other dangerous articles, and combustible liquids accepted for transportation in a foreign port in outside metal or wooden barrels or drums not exceeding 110 gallons capacity, wooden boxes not exceeding 300 pounds weight of box and contents, or fiberboard boxes not exceeding 65 pounds weight of box and contents, which upon arrival at domestic ports are not destined for transportation in these original import containers by common carrier by rail or common or contract carrier by motor vehicle may be accepted on board vessels provided the shipper certified upon the bill of lading or other shipping paper that the container is in conformity with the regulations of the country of origin. If the country of origin has no regulations governing the transportation by vessel of the explosives and dangerous substances involved, the shipper shall certify that the container is so constructed as to maintain its complete integrity under all conditions likely to be encountered during transportation. The master of the vessel, before accepting such import shipments, shall satisfy himself that the containers are sufficiently strong to stand, without rupture or leakage of contents, all risks ordinarily incident to transportation.

(c) Stowage of import shipments on board vessels shall be in accordance with the provisions of these regulations.

Inspection of cargo.—On all vessels, other than barges and magazine vessels storing explosives, an inspection of cargoes of explosives or other dangerous articles or substances shall be ordered by the master of the vessel during a voyage to insure that such cargo is carried with safety and that no damage caused by shifting cargo, spontaneous heating, leaking or sifting of containers, or from other causes has been sustained since loading and stowage. On such vessels that have dangerous cargo stowed on board for a period exceeding 24 hours temperature readings shall be taken at proper intervals and such temperatures recorded and retained as a record of each voyage. When any cargo is discovered to be in a dangerous condition from leakage, sifting, heating, wetting, or other causes, such condition shall be corrected in such manner as the judgment of the master may dictate. All unusual circumstances divulged during inspection of dangerous cargo and any action taken as a result thereof shall be a subject for log entry.

Report fires.—The master of any oceangoing vessel having on board explosives or other dangerous articles or substances as cargo and about to enter a port of the United States shall make or cause to be made an inspection immediately prior to entering such port. If the inspection discloses the presence of fire or any other hazardous condition, such condition shall immediately be reported to the district commander of the United States Coast Guard having supervision over the port or place to which the vessel is bound and the master or person in charge of such vessel shall comply with the instructions given by the district commander as to the procedure to be followed in entering the port or place.

Damaged containers.—(a) Any outside container that is sufficiently damaged as to permit the escape of the contents therein, or shows marks of having leaked, or the securing means give evidence of failure to properly contain the package, shall not be accepted on board any vessel for transportation or storage.

(b) Any damaged outside container, as described in (a) when restored or repaired to the satisfaction of the owner or master of the vessel may be accepted. Special attention shall be given to containers of substances that are required by the regulations to be shipped "wet" to be certain that any escaped liquid is replaced before the restored container is accepted.

(c) Damaged, leaking, or insecure outside containers which it is not feasible to restore shall be refused and promptly reported by the owner or master of the vessel to the nearest board of local inspectors.

(d) Containers of a particular type that frequently show damage, leakage, or other failure shall also be reported to the board of local inspectors for the district in which the cargo was laden. Such information as will assist in correcting faults of such containers should be included in the report.

Emergency shipments.—(a) In event of a casualty occurring to or on board a vessel involving explosives or other dangerous articles or substances on board the vessel as cargo, the master or person in charge of the vessel is authorized to adopt such procedure as will, in his judgment, provide a maximum safety to the vessel, its passengers and crew. When such a casualty results in damaged containers or the emergency use of unauthorized containers, such containers upon arrival at a port shall not be offered to any forwarding carrier for transportation. The vessel owner, agent, charterer, master, or other person in charge of the vessel shall report immediately to the nearest board of local inspectors and request instructions as to disposition of the damaged or unauthorized containers.

(b) Explosives or other dangerous articles or substances found on board a vessel in an unsafe condition may be disposed of by jettisoning or otherwise destroyed or rendered innocuous or may be continued in transportation to the nearest port, whichever course may, in the judgment of the master or person in charge, provide maximum safety to the vessel, its passengers and crew. If such substance is brought into port, delivery shall not be made to the consignee or any forwarding carrier and a report shall immediately be made to the nearest board of local inspectors with a request for instructions as to disposition of the substance. A report shall likewise be made covering the disposition by jettisoning or otherwise of dangerous substances.

Shipments in violation.—(a) Shipments of explosives or other dangerous articles or substances found by a vessel's owner, agent, charterer, master, or person in charge to have been tendered or delivered for transportation on board a vessel under a false or deceptive descriptive name, marking, invoice, shipping paper, or other declaration, or without the shipper furnishing information in writing of the true character thereof at or before the time of delivery, shall be refused transportation and the board of local inspectors for the district in which such cargo was offered shall promptly be notified, in writing, of all the facts in connection with such violation.

(b) When any such shipments are found in transit the master of the vessel is authorized to adopt such procedure as will in his judgment provide maximum safety to the vessel, its passengers and crew. If brought into port, delivery shall not be made to the consignee or any forwarding carrier and a report shall immediately be made to the nearest board of local inspectors with a request for instructions as to disposition of the shipment.

Handling and stowage of cargo.—Explosives or other dangerous articles or substances as cargo shall be handled or stowed on board vessels under the direction and observation of a qualified person assigned for such duty. For vessels engaged in voyages coastwise, or on rivers, bays, sounds, or lakes, including the Great Lakes, when the voyage is not foreign-going, such person may be an employee of the vessel owner or charterer and so assigned by said owner or charterer or he may be a licensed officer attached to the vessel and assigned by the master of the vessel. For domestic vessels engaged in voyages foreign-going or intercoastal such person shall be an officer possessing an unexpired license issued by the Bureau of Marine Inspection and Navigation and assigned to such duty by the owner, charterer, agent or master of the vessel. For foreign vessels such person shall be an officer of the vessel assigned to such duty by the master of the vessel.

Shipments via common carrier vessels.—(a) Regulations promulgated by the Interstate Commerce Commission under the title of "Regulations for the Transportation of Explosives and Other Dangerous Articles" in effect at the time of shipment with respect to definitions, descriptions, descriptive names and classifications of explosives, inflammable liquids, inflammable solids, oxidizing materials, corrosive liquids, compressed gases, and poisonous articles; and with respect to specifications of containers for such articles, and with respect to the packing, marking, labeling, and certification of such articles are adopted and form part of these regulations and shall be complied with by all persons packing and preparing, and all shippers offering such articles for transportation by vessels that are common carriers: *Provided, however*, That the acceptance on board vessels of containers laden with such articles or bulk shipments of such articles shall comply with the provisions of sections 146.02–10 and 146.02–11 of the regulations contained herein. (These are the two foregoing sections entitled "Export Shipments" and "Import Shipments.")

(b) Shipments of combustible liquids or hazardous articles, when prepared, packed, and offered for transportation by vessels that are common carrier vessels shall, with respect to definitions, descriptions, descriptive names and classifications, and with respect to containers for such articles or substances; and with respect to the packing, marking, and certification of such articles or substances conform to the applicable provisions of the regulations contained herein. Import or export shipments of such articles or substances shall comply with the provisions of sections 146.02–10 and 146.02–11 of the regulations contained herein.

Shipments via vessels other than common carriers.—(a) Explosives or other dangerous articles or substances packed in barrels, drums, boxes, cylinders, carboys or bags and offered for transportation or storage on board vessels that are not common carrier vessels shall with respect to definitions, descriptions, descriptive names and classifications of explosives, inflammable liquids, oxidizing materials, corrosive liquids, compressed gases, and poisonous articles, and with

respect to specifications of containers for such articles or substances, and with respect to the packing, marking, labeling, and certification of such articles or substances conform to the requirements of the regulations in effect at the time of shipment as promulgated by the Interstate Commerce Commission under the title of "Regulations for the Transportation of Explosives and Other Dangerous Articles" except as may be otherwise required by the regulations herein. Import or export shipments of such articles or substances shall comply with the provisions of sections 146.02–10 and 146.02–11 of the regulations contained herein.

(b) Shipments of combustible liquids or hazardous articles, prepared, packed, and offered for transportation by vessels other than common carrier vessels, shall, with respect to definitions, descriptions, descriptive names and classifications; and with respect to containers for such articles or substances; and with respect to the packing, marking, and certification of such articles or substances conform to the applicable provisions of the regulations contained herein.

Repairs—(*a*) A vessel having on board explosives or other dangerous articles of cargo shall not proceed to a ship repair plant or enter upon a drydock or marine railway, or otherwise undertake repairs except in compliance with the following conditions:

(b) No repairs, other than emergency repairs to the vessel's main propelling plant or auxiliaries thereto or the boilers or auxiliaries thereto, shall be undertaken while having on board any explosives as cargo.

(c) Repairs shall not be undertaken in holds after the discharge of any cargo of explosives until all precautions are taken to see that no residue of cargo is left to create a hazard.

(d) No repairs shall be undertaken in holds containing any other dangerous articles of cargo nor shall any repairs be undertaken in compartments adjoining holds in which other dangerous articles of cargo are stowed except normal maintenance repairs to the vessel's main propelling or boiler plant or auxiliaries thereto, including tail shaft and propeller.

(e) Before undertaking repairs in holds that have lately contained substances capable of giving off inflammable or explosive vapor, it is required that such holds be gas-free.

(f) Repairs shall not be undertaken in holds that have lately contained cargo consisting of inflammable solids or oxidizing materials until all precautions are taken to see that no residue of cargo is left to create a hazard.

(g) None of the foregoing provisions shall apply to permitted articles of ships' stores and supplies of a dangerous nature, although provisions shall be taken to afford safe storage and protection to such stores from any risk incident to the repair work.

(h) Emergency repairs, contrary to the provisions set forth above, may be undertaken when in the judgment of the master such repairs are necessary for the safety of the vessel, its passengers and crew.

Preservation of records.—(a) Where these regulations require the preparation of shipping orders, manifests, or other shipping documents, cargo lists, cargo stowage plans, reports, and any other papers or records, it shall be the duty of the owner of the vessel to preserve such records or copies thereof in his office or place of business in the United States for a period of at least 1 year Persons or corporations chartering or engaging or contracting for the use of vessels under such terms and conditions that they have full and exclusive control of the management and operating of such vessels shall be subjected to the same requirement for preservation of records as are imposed upon owners of vessels by this section and in such cases the owners shall not be required to preserve such records.

(b) Any records required to be so preserved shall be produced to the Secretary of Commerce upon his request therefor.

LIST OF EXPLOSIVES OR OTHER DANGEROUS ARTICLES

(*Containing the Shipping Name or Description of Articles Subject to the Regulations of the Department of Commerce, Bureau of Marine Inspection and Navigation*)

Dangerous articles not named.—Any article not properly described by a name shown in this commodity list when such article classifies under the definitions

contained herein as a dangerous article shall be prepared and offered for shipment in compliance with these regulations.[3]

Classification.—This list shows the classification of each permitted article or substance. It also shows the articles or substances that are prohibited by the provisions of R. S. 4472; as amended, or that are not permitted by these regulations, for transportation or storage on board vessels.

SIGNS AND ABBREVIATIONS

An asterisk (*) indicates the article may or may not come within the classification shown. If, in accordance with the definitions contained herein, the article does come within the classification it is subject to these regulations:

Inf. L.—Inflammable liquid.
Inf. S.—Inflammable solid.
Oxy. M.—Oxidizing material.
Cor. L.—Corrosive liquid.
Inf. G.—Inflammable compressed gas.
Noninf. G.—Noninflammable compressed gas.
Pois. A.—Poison gas or liquid, class A.
Pois. B.—Poisonous liquid, or solid, class B.
Pois. C.—Tear gas, class C.
Expl. A.—Class A—Explosives.
Expl. B.—Class B—Explosives.
Expl. C.—Class C—Explosives.
Comb. L.—Combustible liquid.
Haz.—Hazardous article.
Prohibited—Means prohibited by R. S. 4472, as amended.
Not permitted—Means not permitted by these regulations.
No restrictions—Means this item is shown in the regulations only to distinguish it from articles under similar name that are classed as dangerous.

COMMODITY LIST

(NOTE.—An asterisk (*) indicates the article may or may not come within the classification shown)

Article	*Classification*
Acetalehyde (ethyl aldehyde)	Inf. L.
Acetic acid:	
Aqueous solution	Comb. L.
Glacial	Comb. L.
Acetic anhydride	Do.
Acetone	Do.
Acetone oils	Inf. L.
Acetyl chloride	Cor. L.
Acetylene	Inf. G.
Acid carboys, empty (see Carboys).	
Acids, liquid, n. o. s.	Cor. L.
Acrolein	Pois. A.
Acrylonitrile	Inf. L.
Airplane flares (see Fireworks)	
Air, compressed	Noninf. G.
Alcohol:	
Allyl, liquid	Pois. B.
Amyl (normal primary, normal secondary, iso amyl)	Comb. L.
Amyl, tertiary	Inf. L.
Butyl	Comb. L.
Secondary	Inf. L.
Tertiary	Do.
Denatured	Do.
Ethyl	Do.
Isobutyl	Comb. L.
Isopropyl	Inf. L.
N. o. s.*	Comb. L.
Do.*	Inf. L.
Alcohol—Continued.	
Propyl*	Inf. L.
Wood	Do.
Alkaline corrosive battery fluid	Cor. L.
With storage batteries. (See Electrolyte (acid) or alkaline corrosive battery fluid packed with storage batteries.)	
Alkaline corrosive liquids, n. o. s.	Do.
Aluminum:	
Liquid* (see also Bronzing liquid)*	Inf. L.
Nitrate	Oxy. M.
Powder, uncoated	Haz.
Ammonium:	
Arsenate, solid	Pois. B.
Bichromate	Oxy. M.
Nitrate	Do.
Perchlorate	Do.
Permanganate	Do.
Picrate. (See High explosives.)	
Wet (when wet with not less than 10 percent of water and in a quantity not exceeding 16 ounces in one outside package)	Inf. S.

[3] Unless otherwise exempt by the Provisions of the Detail Regulations.

Article	Classification
Ammunition:	
Chemical. (See Chemical ammunition.)	
Explosive. (See Ammunition—projectiles, grenades, bombs, mines, and torpedoes.)	
For cannon:	
Nonexplosive	No restrictions.
With empty projectiles (see also Ammunition, for cannon, with nonexplosive projectile).	Expl. B.
With explosive gas, smoke, or incendiary projectiles.	Expl. A.
With nonexplosive projectiles.	Expl. B.
With sand-loaded projectiles (see also Ammunition, for cannon, with nonexplosive projectile).	Do.
With solid projectiles (see also Ammunition, for cannon, with nonexplosive projectile).	Do.
Without projectiles (see also Ammunition, for cannon, with nonexplosive projectile).	Do.
For small arms	Expl. C.
With explosive bullets.	Expl. A.
Amyl:	
Acetate*	Inf. L.
Do*	Comb. L.
Nitrate	Inf. L.
Anhydrous ammonia	Noninf. G.
Aniline oil drums, empty	Haz.
Aniline oil, liquid	Pois. B.
Anti-freeze compounds, liquid.*	Comb. L.
Do*	Inf. L.
Antimony pentachloride	Cor. L.
Argon	Noninf. G.
Arsenic:	
Acid:	
Liquid	Pois. B.
Solid	Do.
Bromide, solid	Do.
Chloride (arsenous), liquid.	Do.
Iodide, solid	Do.
Metal, solid	Do.
Pentoxide, solid	Do.

Article	Classification
Arsenic—Continued.	
Solid. (See Arsenic metal, solid.)	
Sulfide (powder), solid	Pois. B.
Trichloride (see Arsenic chloride (arsenous), liquid).	Do.
Trioxide, solid	Do.
White, solid	Do.
Arsenical compounds or mixtures, n. o. s., solid.	Do.
Arsenical dip, liquid (sheep dip).	Do.
Arsenical dust. (See Insecticide, dry.)	
Arsenical flue dust. (See Insecticide, dry.)	
Arsenous and mercuric iodide solution, liquid.	Do.
Arsenous acid, solid	Do.
Asphalt, cut-back.* (See Road asphalt or Tar, liquid.)	
Asphalt	Haz.
Automobiles, motorcycles, tractors, or other self-propelled vehicles:	
New or used, when offered for transportation without boxing or crating and containing no gasoline or other motor fuel within the fuel tanks.	Do.
New or used, when offered for transportation without boxing or crating and containing gasoline or other motor fuel within the fuel tank.	Do.
New or used, within boxes or crates, when shipped as cargo, and containing no lubricating oil, gasoline or other motor fuel within the motor or fuel tank.	Do.
Bags, nitrate of soda:	
Empty and unwashed	Inf. S.
Empty and washed. (See Burlap bags, used and washed.)	
Barium:	
Binoxide. (See Barium peroxide.)	
Chlorate. (See Chlorates.)	
Wet. (See Chlorates, wet.)	
Cyanide, solid	Pois. B.
Dioxide. (See Barium peroxide.)	
Nitrate	Oxy. M.

Article	Classification
Barium—Continued.	
Perchlorate. (See under Perchlorates.)	
Permanganate. (See under Permanganates.)	
Peroxide	Oxy. M.
Barrels, empty. (See Drums, empty.)	
Batteries:	
Dry	No restrictions.
Electric, storage, wet	Cor. L.
With containers of corrosive battery fluid. (See Electrolyte (acid) or Alkaline corrosive battery fluid packed with storage batteries.)	
Battery charger with electrolyte (acid) or alkaline corrosive liquid. (See Electrolyte (acid) or alkaline corrosive battery fluid packed with battery charger or radio current supply device or parts thereof.)	
Battery fluid. (See Electrolyte (acid) battery fluid or Alkaline corrosive battery fluid.)	
Battery parts (plates, grids, etc., unwashed, exhausted)	Haz.
Benzaldehyde	Comb. L.
Benzene	Inf. L.
Benzine	Do.
Benzol. (See Benzene.)	
Benzoyl:	
Chloride	Cor. L.
Peroxide, dry (granular form.)	Inf. S.
Peroxide, wet (with not less than 30 percent water.)	Do.
Benzyl chloride	Cor. L.
Black blasting powder. (See Black powder.)	
Black pellet powder. (See Black powder.)	
Black powder	Expl. A.
Black powder igniters with empty cartridge bags. (See Igniters.)	
Black rifle powder. (See Black powder.)	
Blasting caps:	
Electric. (See Electric blasting caps.)	
1,000 or less	Expl. C.
More than 1,000	Expl. A.
With safety fuse:	
More than 1,000	Do.
1,000 or fewer caps	Expl. C.
Blasting gelatin. (See High explosives.)	
Blasting powder. (See Black powder.)	
Bleaching powder	Haz.
Bombs:	
Explosive. (See Explosives, bombs.)	
Explosive, gas, smoke, or incendiary. (See Explosives, bombs.)	
Fireworks. (See Fireworks.)	
Gas, smoke, or incendiary nonexplosive. (See Chemical ammunition.)	
Sand-loaded or empty. (See Ammunition, for cannon, nonexplosive.)	
Bone, chipped (heat-treated).	Haz.
Boosters (explosive)	Expl. A.
Bordeaux arsenites:	
Liquid	Pois. B.
Solid	Do.
Boron trichloride	Cor. L.
Do	Noninf. G.
Bottles, acid or other corrosive liquid, empty.	Haz.
Box toe board (nitrocellulose base).	Do.
Box toe gum*	Comb. L.
Do*	Inf. L.
Bromacetone, liquid	Pois. A.
Brombenzyl cyanide, liquid	Pois. C.
Bromine	Cor. L.
Bromobenzene	Comb. L.
Bromomethane, liquid. (See Methyl bromide, liquid.)	
Bronzing liquid*	Inf. L.
Brucine, solid	Pois. B.
Burlap bags:	
New	Haz.
Used and unwashed	Do.
Used and washed	Do.
Burlap cloth (Hessian)	Haz.
Burnt cotton (not repicked)	Inf. S.
Burnt fibers. (See Fibers, burnt, wet or damp.)	
Butane. (See Liquefied petroleum gas.)	
Butyl:	
Acetate	Comb. L.
Ether	Do.
Cacodylic acid, solid	Pois. B.
Calcium:	
Arsenate, solid	Do.
Arsenite, solid	Do.
Carbide	Haz.
Chlorate (see Chlorates)	Oxy. M.
Chlorite	Do.

Article	*Classification*
Calcium—Continued.	
Cyanamide, not hydrated.	Haz.
Hypochlorite. (See Bleaching powder.)	
Metallic	Inf. S.
Nitrate	Oxy. M.
Perchlorate. (See under Perchlorates.)	
Permanganate. (See under Permanganates.)	
Peroxide	Do.
Phosphide	Inf. S.
Camphene	Haz.
Camphor (crude, refined, or synthetic).	Do.
Camphor oil	Comb. L.
Cannon powder. (See Black powder.)	
Cannon primers. (See Primers.)	
Caps:	
Blasting. (See Blasting caps.)	
Toy. (See Toy caps.)	
Carbolic acid:	
Fused solid. (See Carbolic acid, solid.)	
Liquid (liquid tar acid containing over 50 percent benzophenol).	Pois. B.
Solid	Do.
Carbon:	
Bisulfide	Inf. L.
Dioxide, liquefied	Noninf. G
Disulfide. (See Carbon bisulfide.)	
Monoxide	Inf. G.
Carbon dioxide syphon bulbs.	Do.
Carbon remover, liquid* (See also Compounds, cleaning, liquid.*)	Comb. L.
Carbonyl chloride. (See Phosgene.)	
Carboys, empty	Haz.
Cartridge bags, empty, with black powder igniters.	Expl. C.
Cartridge cases, empty, primed (see also Primers.)	Do.
Case oil. (See under proper shipping name, as Benzene, Benzine, Gasoline.)	
Casinghead gasoline. (See Natural gasoline.)	
Caustic potash:	
Liquid	Cor. L.
Solid	Haz.
Caustic soda:	
Liquid	Cor. L.
Solid	Haz.
Cement:	
Leather*	Comb. L.
Do.*	Inf. L.
Liquid, n. o. s.*	Comb. L.
Do.*	Inf L.

Article	*Classification*
Cement—Continued.	
Roofing, liquid*	Comb. L.
Do.*	Inf. L.
Rubber*	Comb. L.
Do.*	Inf. L.
Charcoal:	
Activated	Inf. S.
Animal	Do.
Bone	Do.
Briquets	Do.
Screenings: Made from "pinon" wood.	Do.
Wet	Not permitted.
Shell	Inf. S.
Wet	Not permitted.
Wood, crushed, granulated, ground, or pulverized.	Inf. S.
Wood:	
Lump	Do.
Screenings, other than "pinin" wood screenings.	Do.
Chemical ammunition:	
Containing class A poisonous gases or liquids.	Pois. A.
Containing class B poisons, liquids, or gases.	Pois. B.
Containing class C poisons, liquids, or gases.	Pois. C.
Explosive. (See Ammunition, for cannon, with explosive gas, smoke, or incendiary projectiles.)	
Chloracetophenone, gas, liquid or solid.	Do.
Chloracetyl chloride	Cor. L.
Chlorate explosives, dry. (See High explosives.)	
Chlorate powders. (See High explosives.)	
Chlorates	Oxy. M.
Wet	Do.
Chlorbenzene. (See Monochlorbenzene.)	
Chloride of lime. (See Bleaching powder.)	
Chloride of phosphorus. (See Phosphorus trichloride.)	
Chloride of sulfur. (See Sulfur chloride.)	
Chlorinated lime. (See Bleaching powder.)	
Chlorine	Noninf. G.
Chlorosulfonic acid	Cor. L.
Chlorosulfonic acid sulfur trioxide mixture.	Do.
Chlorpicrin:	
Absorbed	Pois. A.
Liquid	Do.
Mixtures	Do.

Article	*Classification*
Chromic acid	Oxy. M.
Solution	Cor. L.
Cleaning fluid or liquid*	Do.
(See Compounds, cleaning, liquid.)*	Inf. L.
Cloud gas cylinders. (See Chemical ammunition.)	
Coal:	
Briquets, hot	Not permitted.
Facings	Inf. S.
Gas	Inf. G.
Coal oil (export shipments only.) (See Kerosene.)	
Coal tar:	
Distillate*	Inf. L.
N. o. s.*	Comb. L.
Light oil. (See Benzene.)	
Naphtha	Inf. L.
Oil. (See Coal-tar distillate.)	
Cobalt resinate:	
Fused	No restrictions.
Precipitated	Inf. S.
Cocculus, solid (fishberry)	Pois. B.
Coir. (See Fibers.)	
Coke, hot	Not permitted.
Collodion	Inf. L.
Collodion cotton:	
Wet with an inflammable liquid (export shipments only). (See Nitrocellulose, wet with an inflammable liquid.)	
Wet with water (export shipments only). (See Nitrocellulose, wet with water.)	
Cologne spirits (alcohol). (See Alcohol, ethyl.)	
Colored fire. (See Fireworks.)	
Columbian spirits. (See Alcohol, wood.)*	
Combination fuzes	Expl. C.
Combination primers	Do.
Combustible liquid, n. o. s.	Comb. L.
Compounds:	
Cleaning, liquid*	Inf. L.
Do*	Cor. L.
Do*	Comb. L.
Lacquer, paint, or varnish reducing, liquid.*	Do.
Do (See also Paint, liquid.)	Inf. L.

Article	*Classification*
Compounds—Continued.	
Lacquer, paint, or varnish removing, liquid.*	Comb. L.
Do.*	Cor. L.
Do.* (See also Paint, liquid.)	Inf. L.
Lacquer, paint, or varnish thinning, liquid.*	Comb. L.
Do.* (See also Paint, liquid.)	Inf. L.
Polishing, liquid (see also Polishing compounds, liquid).*	Do.
Type-cleaning, liquid (see Compounds, cleaning, liquid).*	Do.
Vulcanizing, liquid*	Cor. L.
Do. (See Cement, rubber.)*	Inf. L.
Compressed gases, n. o. s.	Inf. G. or Noninf. G.
Containers, empty. (See Bottles; Carboys; Cylinders; and Drums.)	
Copper acetoarsenite, solid	Pois. B.
Copper arsenite, solid	Do.
Copra	Haz.
Cordeau detonant	Expl. C.
Cork:	
Granulated	Haz.
Ground	Do.
Corrosive liquid, n. o. s.	Cor. L.
Cotton	Haz.
Batting	Do.
Batting dross	Do.
Burnt (not repicked). (See Burnt cotton.)	
Sweepings. (See Cotton waste.)	
Wadding	Do.
Waste	Do.
Waste, oily. (See Fibers or fabrics with animal or vegetable oil.)	
Wet. (See Fibers, burnt, wet, or damp.)	
Cottonseed hull fiber or shavings, pulp or cut linters.	Do.
Cresol, liquid (cresylic acid).*	Comb. L.
Creosote:	
Coal tar	Do.
Oil. (See under Coal tar.)	
Cresylic acid.* (See Cresol, liquid.)	
Crotonaldehyde	Inf. L.

Article	*Classification*
Crude nitrogen fertilizer solution.	Noninf. G.
Crude oil, petroleum*	Comb. L.
Do.*	Inf. L.
Cyanide mixtures, dry	Pois. B.
Cyanide of:	
Calcium, solid	Do.
Copper	No restrictions.
Lead	Do.
Potassium:	
Liquid	Pois. B.
Solid	Do.
Silver	No restrictions.
Sodium:	
Liquid	Pois. B.
Solid	Do.
Zinc	No restrictions.
Cyanides, dry	Pois. B.
Cyanogen gas	Pois. A.
Cyclopropane	Inf. G.
Cylinders, empty	Haz.
Dead oil. (See Creosote, coal tar.)	
Decahydronaphthalene*	Comb. L.
Decalin. (See Decahydronaphthalene.)	
Delay electric igniters	Expl. C.
Depth bombs. (See Explosives, bombs.)	
Deteriorated smokeless powder:	
For cannon	Expl. B.
For small arms	Do.
Detonating fuzes	Expl. A.
Diazodinitrophenol. (See Initiating explosive.)	
Dichlorethylene. (See Ethylene dichloride.)	
Dichlorodifluoromethane	Noninf. G
Dichloropentanes	Comb. L.
Di-isobutyl ketone	Do.
Dimethoxy strychnine. (See Brucine, solid.)	
Dimethylamine:	
Anhydrous	Inf. L.
Solution	Do.
Dimethylarsenic acid, solid. (See Cacodylic acid, solid.)	
Dimethyl:	
Ether	Inf. G.
Sulfate	Cor. L.
Sulfide	Inf. L.
Dinitrobenzol:	
Liquid	Pois. B.
Solid	Do.
Dinitrochlorbenzol, solid	Do.
Dinitrotoluene, liquid (dinitrotoluol, liquid).	Comb. L.
Diphenylaminechlorarsine, gas, liquid, or solid.	Pois. C.

Article	*Classification*
Diphenylchlorarsine, solid	Pois. C.
Diphosgene. (See Phosgene.)	
Disinfectant, liquid*	Comb. L.
Dressing, leather (see also Paint, liquid)*	Do.
Do	Inf. L.
Driers, paint or varnish (see also Paint, liquid.)*	Comb. L.
Do	Inf. L.
Drill cartridges. (See Ammunition, for cannon, nonexplosive.)	
Drugs, chemicals, medicines, or cosmetics.*	Inf. L.
Do.*	Inf. S. or Oxy. M.
Do.*	Cor. L.
Do.*	Pois. B.
Do.*	Comb. L.
Drums, empty	Haz.
Dummy cartridges. (See Ammunition, for cannon, nonexplosive.)	
Dynamite. (See High explosives.)	
Electric blasting caps (see also Blasting caps):	
1,000 or less	Expl. C.
More than 1,000	Expl. A.
Electric squibs	Expl. C.
Electrolyte (acid) or alkaline corrosive battery fluid packed with battery charger or radio current supply device or parts thereof.	Cor. L.
Electrolyte (acid) or alkaline corrosive battery fluid packed with storage batteries.	Do.
Electrolyte (acid) battery fluid.	Do.
Empty cartridge bags—black powder igniters. (See Igniters.)	
Empty cartridge cases primed (see also Primers).	Do.
Eradicators, paint or grease, liquid.*	Comb. L.
Eradicators (see also Paints, liquid).	Inf. L.
Essence (export shipments only). (See Gasoline, Gazolina, Gazoline.)	
Ethane	Inf. G.
Ether:	
Anesthetic	Inf. L.
Diethyl	Do.
Ethyl	Do.
Sulfuric	Do.
Technical or commercial grade.	Do.
Ethyl:	
Acetate	Do.
Aldehyde. (See Acetaldehyde.)	

Article	*Classification*
Ethyl—Continued.	
Benzene	Comb. L.
Bromide	Comb. L.
Butyl acetate	Do.
Butyrate	Do.
Chloroacetate	Inf. L.
Chloride	Inf. L.
Hexaldehyde	Comb. L.
Lactate	Do.
Methyl ketone	Inf. L.
Nitrate	Do.
Nitrite	Do.
Silicate	Comb. L.
Ethyldichlorarsine	Pois. A.
Ethylene	Inf. G.
Chlorhydrin	Comb. L.
Dichloride	Inf. L.
Glycol diethyl ether	Comb. L.
Glycol monomethyl ether.	Do.
Glycol monoethyl ether	Do.
Glycol monomethyl ether acetate.	Do.
Glycol monoethyl ether acetate.	Do.
Oxide	Inf. L.
Excelsior (shredded wood)	Haz.
Explosives:	
Bombs	Expl. A.
Compositions, that ignite spontaneously.	Prohibited.
Compositions, that undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 167° F.	Do.
Compositions, containing an ammonium salt and a chlorate.	Do.
Hand grenades	Expl. A.
Do	Do.
High	Do.
Initiating	Do.
Low	Do.
Mines	Do.
Projectiles	Do.
Rifle grenades	Do.
Torpedoes	Do.
Samples of. (See section 146.20-5 and 146.20-6 of Regulations.)	
Extracts, liquid flavoring*	Comb. L.
Extracts (see also Alcohol, n. o. s.)	Inf. L.
Feed, wet, mixed	Haz.
Felt waste. (See Cotton waste.)	
Felt, waste, wet. (See Fibers, burnt, wet or damp.)	
Ferric arsenate, solid	Pois. B.
Do	Do.
Ferrophosphorus	Haz.

Article	*Classification*
Ferrophosphorus briquets	No restrictions.
Ferrosilicon briquets	Haz.
Ferrosilicon:	
Containing between 45 and 48 percent or containing between 65 and 70 percent silicon.	Do.
Containing between 48 and 65 percent silicon.	Do.
Containing less than 45 percent or more than 70 percent silicon.	Do.
Ferrous arsenate, solid	Pois. B.
Fertilizer, ammoniating solution, containing free ammonia.*	Noninf. G.
Fiberboard scrap (when dry, clean, and free from oil.) (See Paper scrap.)	
Fibers, burnt, wet or damp	Inf. S.
Fibers (jute, hemp, flax, sisal, coir, kapok, and similar vegetable fibers).	Haz.
Fibers or fabrics, with animal or vegetable oil.	Inf. S.
Film support, nitrocellulose base. (See Pyroxylin plastics, rods, rolls, sheets, tubes.)	
Firecrackers. (See Fireworks.)	
Fire extinguisher charges.	Cor. L.
Fire extinguishers hand (containing nonliquefied gas).	Noninf. G.
Fireworks	Expl. B.
Fireworks, forbidden	Not permitted.
Fish oils	Haz.
Fish scrap, or fish meal:	
Containing at least 6 percent and not more than 12 percent moisture.	Do.
Containing less than 6 percent or more than 12 percent moisture.	Inf. S.
Fish scrap, wet acidulated	Haz.
Flares:	
Airplane. (See Fireworks.)	
Signal. (See Fireworks.)	
Flash cartridges (See Fireworks and low explosives.)	
Flash crackers. (See Fireworks.)	
Flash powder. (See Fireworks and low explosives.)	
Flash sheets. (See Fireworks and low explosives.)	

Article	Classification
Flax. (See Fibers.)	
Formaldehyde	Comb. L.
Formalin. (See Formaldehyde.)	
Formic acid	Cor. L.
Fuel oil:	
C. S. No. 1	Comb. L.
C. S. No. 2*	Do.
C. S. No. 3*	Do.
Do*	Do.
Fulminate of mercury:	
Dry	Prohibited.
Wet. (See Initiating explosive.)	
Furfural	Comb. L.
Furniture stain, liquid* (see also Paint, liquid).	Inf. L.
Fuses, railway. (See Fireworks.)	
Fuse:	
Igniters	Expl. C.
Instantaneous	Do.
Lighters	Do.
Safety	Do.
Fusel oil	Comb. L.
Fuzes:	
Combination, percussion, time or tracer.	Do.
Detonating	Expl. A.
Garbage tankage:	
Containing less than 8 percent moisture.	Inf. S.
Containing 8 percent or more of moisture.	Haz.
Gas drips, hydrocarbon	Do.
Gas identification sets	Pois. C.
Do	Pois. A.
Gas oil*	Comb. L.
Gasoline	Inf. L.
Gazolina (export shipments only). (See Gasoline.)	
Gazoline (export shipments only). (See Gasoline.)	
Gelatine dynamite. (See High explosives.)	
Gravure ink. (See Ink.)*	
Grenades:	
Empty, primed (see also Primers).	Expl. C.
Hand, explosive. (See Explosives, hand grenades.)	
Rifle, explosive. (See Explosives, rifle grenades.)	
Ground bituminous coal. (See Coal facings.)	
Guanyl nitrosamino guanylidene hydrazine. (See Initiating explosive.)	
Guanyl nitrosamino guanyl tetrazene. (See Initiating explosive.)	
Guncotton. (See High explosives.)	
Hair, wet	Inf. S.

Article	Classification
Hay	Haz.
Hay or straw (loose, wet or damp).	Not permitted.
Helium	Noninf. G.
Hemp. (See Fibers.)	
Hemp, wet. (See Fibers, burnt, wet or damp.)	
Hessian. (See Burlap cloth.)	
Hexaldehyde	Comb. L.
High explosives	Expl. A.
Highway signals. (See Fireworks, fusees.)	
Hydriodic acid	Cor. L.
Hydrobromic acid	Do.
Hydrocarbon gas:	
Liquefied	Inf. G.
Nonliquefied	Do.
Hydrochloric acid	Cor. L.
Mixtures	Do.
Hydrocyanic acid:	
Liquid	Pois. A.
Solutions	Pois. B.
Unstabilized	Not permitted.
Hydrofluoric acid	Cor. L.
Anhydrous	Do.
Hydrofluosilicic acid	Cor. L.
Hydrogen	Inf. G.
Dioxide. (See Hydrogen peroxide.)	
Peroxide (containing over 7.41 percent (25 volume) H_2O_2).	Cor. L.
Sulfide	Inf. G.
Igniters	Expl. C.
Illuminating projectiles. (See Fireworks.)	
Inflammable liquids, n. o. s.	Inf. L.
Inflammable solids, n. o. s.	Inf. S.
Initiating explosives	Expl. A.
Ink*	Comb. L.
Do.*	Inf. L.
Insecticide:	
Dry*	Pois. B.
Liquid*	Do.
Vermin exterminator, liquid.*	Comb. L.
Do.*	Inf. L.
Instantaneous fuse	Expl. C.
Insulation tape (varnished cloth type). (See Oiled textiles.)	
Iron:	
Arsenate, solid. (See Ferrous or ferric arsenate, solid.)	
Oxide. (See Iron sponge.)	
Sponge	Haz.
Spent	Do.
Isobutane. (See Liquefied petroleum gas.)	
Isopropanol. (See Alcohol, isopropyl.)	
Jute, wet. (See Fibers, burnt, wet or damp.)	

Article	*Classification*
Kapok. (See Fibers.)	
Kerosene (coal oil)	Comb. L.
Kerozene (export shipment only). (See Kerosene.)	
Lacquer*	Do.
Lacquer (see Paint, liquid)*	Inf. L.
Lacquer base:	
Liquid*	Comb. L.
Do.*	Inf. L.
Lacquer base, or lacquer chips:	
Dry	Inf. S.
Plastic (wet with an inflammable liquid).	Inf. L.
Lead:	
Arsenate, solid	Pois. B.
Arsenite, solid	Do.
Azide. (See Initiating explosive.)	
Dross	Haz.
Nitrate	Oxy. M.
Scrap	Haz.
Styphnate (lead trinitroresorcinate). (See Initiating explosive.)	
Type dross	No restrictions.
Leather bleach* (see also Paint, liquid).	Inf. L.
Lewisite	Pois. A.
Lime nitrogen. (See Calcium cyanamide, not hydrated.)	
Lime, unslaked	Haz.
Liquefied carbon dioxide. (See Carbon dioxide, liquefied.)	
Liquefied hydrocarbon gas. (See Hydrocarbon gas, liquefied.)	
Liquefied petroleum gas	Inf. G.
London purple, solid	Pois. B.
Long-time burning oil (export shipment only). (See Kerosene.)	
Low blasting explosive. (See Low explosives.)	
Low explosives	Expl. A.
Lye. (See Caustic soda, solid.)	
Machines or apparatus (assembled for shipment containing not over 15 pounds weight of gas or liquid for their operation.	Noninf. G.
Magnesium:	
Arsenate, solid	Pois. B.
Metallic, powder	Inf. S.
Nitrate	Oxy. M.
Perchlorate	Do.
Peroxide	Do.
Manganese dioxide	Haz.
Matches:	
Book	Inf. S.
Card	Do.
Strike-anywhere	Do.

Article	*Classification*
Strike-on-box	Do.
Mercuric:	
Acetate	Pois. B.
Ammonium chloride, solid	Do.
Benzoate, solid	Do.
Bromide, solid	Do.
Cyanide, solid	Do.
Cyanamid, solid	Do.
Iodide, solid	Do.
Oleate, solid	Do.
Oxide:	
Red, solid	Do.
Yellow, solid	Do.
Oxycyanide, solid	Do.
Potassium iodide, solid	Do.
Salicylate, solid	Do.
Subsulfate, solid	Do.
Sulfate, solid	Do.
Sulfocyanate, solid	Do.
Mercurol, solid	Do.
Mercurous:	
Bromide, solid	Do.
Gluconate, solid	Do.
Iodide, solid	Do.
Nitrate, solid	Do.
Oxide, black, solid	Do.
Sulfate, solid	Do.
Mercury:	
Acetate, solid	Do.
Bichloride, solid	Do.
Bisulfate, solid	Do.
Compounds, n. o. s. (solid).	Do.
Cyanide, solid	Do.
Nucleate, solid (see also Mercurol, solid).	Do.
Methane	Inf. G.
Methanol (see Alcohol, wood).	Inf. L.
Methyl:	
Acetate	Do.
Acetone	Do.
Alcohol (see also Alcohol, wood).	Do.
Amyl acetate	Comb. L.
Amyl ketone	Do.
Bromide, liquid	Pois. B.
Chloride	Inf. G.
Dichlorarsine	Pois. A.
Formate	Inf. L.
Mesityl oxide	Comb. L.
Mineral spirits.* (See Compounds, lacquer, paint, or varnish reducing, liquid.)	
Mines, explosive. (See Explosive mines.)	
Mixed acid	Cor. L.
Monobrombenzene (see also Bromobenzene).	Comb. L.
Monochloracetone, stabilized	Pois. C.
Monochlorbenzene (chlorbenzene) (chlorbenzol).	Comb. L.
Monochloroacetone	Pois. A.
Monomethylamine	Inf. G.

Article	*Classification*
Mortar stain, liquid* (see also Paint, liquid)	Inf. L.
Moth balls. (See Naphthalene.)	
Motion-picture film:	
Cellulose acetate base	No restrictions.
Nitrocellulose base (positive or negative).	Inf. S.
Old and worn out	No restrictions.
Cellulose acetate base.	Do.
Nitrocellulose base	Do.
Scrap (nitrocellulose base). (See Pyroxylin plastic scrap.)	
Toy	Inf. S.
Standard width	Do.
Unexposed (nitrocellulose base).	Inf. S.
Motor fuel (export shipments only). (See Gasoline.)	
Motor fuel antiknock compound.	Pois. B.
Motor fuel, n. o. s.*	Comb. L.
Do.*	Inf. L.
Motor spirit (export shipments only). (See Gasoline.)	
Muriatic acid. (See Hydrochloric acid.)	
Mustard gas	Pois. A.
Nafta (export shipment only). (See Gasoline.)	
Naphtha:	
Coal tar. (See Coal-tar naphtha.)	
Distillate. (See Petroleum.)	
Petroleum. (See Benzine.)	
Solvent. (See Coal-tar naphtha.)	
Naphthalene	Haz.
Naphthalin	Do.
Natural gasoline (casinghead gasoline)	Inf. L.
Negative cotton. (See High explosives.)	
Neon gas	Noninf. G.
Nickel:	
Carbonyl	Inf. L.
Cyanide, solid	Pois. B.
Nicotine:	
Hydrochloride	Do.
Liquid. (See Insecticide liquid.)	
Salicylate	Do.
Sulfate, solid or liquid. (See Insecticide, dry or liquid.)	
Tartrate	Do.

Article	*Classification*
Nitrate of ammonia explosives. (See High explosives.)	
Nitrates, n. o. s.	Oxy. M.
Nitrating acid. (See Mixed acid.)	
Nitric acid	Cor. L.
Nitrobenzene, liquid	Pois. B.
Nitrobenzol, liquid. (See Nitrobenzene, liquid.)	
Nitro-carbo nitrate (see also Nitrate)	Oxy. M.
Nitrocellulose:	
Dry (see High explosives).	
Wet with an inflammable liquid.	Inf. L.
Wet with water	Inf. S.
Nitrochlorobenzene:	
Meta or para, solid	Pois. B.
Ortho, liquid	Do.
Nitrogen	Noninf. G.
Dioxide, liquid	Pois. A.
Peroxide	Do.
Tetroxide	Do.
Nitroglycerin:	
Liquid	Expl. A.
Spirits of	Inf. L.
Nitroguanidine, wet with water	Inf. S.
Nitromannite. (See Initiating explosive.)	
Nitromannite. (See Inititiating explosive.)	
Nitrostarch:	
Dry. (See High explosives.)	
Wet with an inflammable liquid (see also Nitrocellulose).	Inf. L.
Wet with water	Inf. S.
Nitrosyl chloride	Noninf. G.
Nitrous oxide	Do.
Nonliquefied gases. (See Compressed gases, n. o. s.)	
Oakum	Haz.
Oil*	Inf. L.
Oil, n. o. s.*	Do.
Oil of mirbane (see also Nitrobenzene, liquid).	Pois. B.
Oil of vitriol. (See Sulfuric acid.)	
Oiled clothing (manufactured articles properly dried to prevent spontaneous heating).	Haz.
Oiled paper (manufactured articles properly dried to prevent spontaneous heating).	Do.
Oiled textiles (manufactured articles properly dried to prevent spontaneous heating).	Do.
Oxidizing materials, n. o. s.	Oxy. M.

Article	Classification
Oxygen	Noninf. G.
Paint:	
Aluminum, bronzing, or gold.*	Comb. L.
Liquid*	Do.
Do*	Inf. L.
Paint, varnish, or lacquer reducing compounds.* (See Compounds.)*	
Paint, varnish, or lacquer removing compounds.* (See Compounds.)*	
Paint, varnish, or lacquer thinning compounds.* (See Compounds.)*	
Paper-cap ammunition for toy pistols. (See Toy caps.)	
Paper caps. (See Toy caps.)	
Paper scrap (when dry, clean, and free from oil).	Haz.
Paper stock, wet	Inf. S.
Paper waste:	
When dry, clean, and free from oil.	Haz.
Wet	Inf. S.
Paraffin (export shipment only). (See Kerosene.)	
Paraldehyde	Comb. L.
Paranitraniline, solid	Pois. B.
Paris green, solid. (See Copper acetoarsenite, solid.)	
Pent-acetate. (See Amyl acetate.)	
Pentaerythrite tetranitrate. (See Initiating explosive.)	
Pentane	Inf. L.
Permanganates, n. o. s	Oxy. M.
Perchloric acid:	
Not exceeding 72 percent strength.	Cor. L.
Exceeding 72 percent strength.	Not permitted
Percussion caps	Expl. C.
Percussion fuzes	Do.
Permanganate of potash. (See Permanganates.)	
Permanganates, n. o. s	Oxy. M.
Petrol (export shipments only). (See Gasoline.)	
Petroleum:	
Distillate*	Inf. L.
Do*	Comb. L.
Ether. (See Benzine.)	
Gas, liquefied. (See Petroleum gas.)	
Naphtha.* (See Benzine.)	
Naphtha*	Do.
Oil.* (see under Oil)	Inf. L.
Spirits.* (See Compounds, lacquer, paint, or varnish reducing liquid.)	

Article	Classification
Phenol:	
Liquid. (See Carbolic acid, liquid.)	
Solid. (See Carbolic acid, solid.)	
Phenylcarbylamine chloride	Pois. A.
Phenyldichlorarsine, liquid	Pois. B.
Phosgene	Pois. A.
Phosphoric anhydride	Inf. S.
Phosphorus:	
Amorphous, red	Do.
Oxychloride	Cor. L.
Pentachloride	Inf. S.
Sesquisulfide	Do.
Tribromide	Cor. L.
Trichloride	Do.
White or yellow, dry	Inf. S.
White or yellow, in water.	Do.
Photographic film:	
Cellulose acetate base	No restrictions.
Nitrocellulose base	Inf. S.
Scrap:	
Cellulose acetate base	No restrictions.
Nitrocellulose base. (See Pyroxylin plastic scrap.)	
Photographic flash lamps:	
Capable, upon breakage, of igniting inflammable vapors or finely divided combustible substances.	Haz.
That will not, upon breakage, ignite inflammable vapors or finely divided combustible substances.	No restrictions.
Photographic flash powder. (See Fireworks.)	
Picrates, dry. (See High explosives.)	
Picric acid:	
Dry. (See High explosives.)	
Wet with not less than 10-percent water, in excess of 16 ounces but not exceeding 25 pounds.	Inf. S.
Wet with not less than 10-percent water, over 25 pounds. (See High explosives.)	
Pine oil	Comb. L.
Pintsch gas	Inf. G.
Pinwheels. (See Fireworks.)	
Poisonous liquid or gas, n. o. s.	Pois. A.

Article	*Classification*
Poisonous liquids, n. o. s.	Pois. B.
Do	Pois. C.
Poisonous solids, n. o. s.	Pois. B.
Do	Pois. C.
Police grenades:	
Liquid	Pois. A.
Tear gas	Pois. C.
Polish, furniture, liquid*	Inf. L.
Polishing compounds:	
Liquid*	Comb. L.
Do.*	Inf. L.
Polish:	
Metal liquid*	Do.
Stove liquid*	Do.
Potassium:	
Arsenate, solid	Pois. B.
Arsenite, solid	Do.
Bromate	Oxy. M.
Chlorate (see also Chlorates).	Do.
Hydroxide. (See Caustic potash solid.)	
Solution. (See Caustic potash liquid.)	
Metallic	Inf. S.
Nitrate	Oxy. M.
Perchlorate (see under Perchlorates).	Do.
Permanganate (see under Permanganates).	Do.
Peroxide	Do.
Sulfide (fused or concentrated and ground).	Inf. S.
Sulfide (fused or concentrated but not ground—may be chipped or broken).	Do.
Potato spray (arsenical) liquid. (See Insecticide liquid.)	
Primers	Expl. C.
Projectiles:	
Explosives. (See Explosive projectiles.)	
Gas, smoke, or incendiary nonexplosive. (See Chemical ammunition, class A, B, or C.)	
Illuminating. (See Fireworks.)	
Sand-loaded, empty or solid. (See Ammunition for cannon, nonexplosive.)	
Propane. (See Liquefied petroleum gas.)	
Propanol. (See Alcohol, propyl.)	
Propylene	Inf. G.
Prussic acid. (See Hydrocyanic acid, liquid.)	
Unstabilized. (See Hydrocyanic acid, unstabilized.)	

Article	*Classification*
Pyridine*	Inf. L.
Pyrosulfuryl chloride	Cor. L.
Pyroxylin:	
Plastics, rods, rolls, sheets, tubes.	Inf. S.
Plastic scrap	Do.
Solutions (see also Lacquer base, liquid).	Inf. L.
Solvents, n. o. s.	Do.
Quicklime (see also Lime, unslaked).	Haz.
Rags:	
Oily. (See Fibers or fabrics with animal or vegetable oil.)	
Scrap (when dry, clean and free from oil).	Haz.
Wet. (See Fibers, burnt, wet, or damp.)	
Railway fusees. (See Fireworks.)	
Range oil*	Comb. L.
Refrigerating machines:	
Assembled for shipment and containing not over 15 pounds of an inflammable liquid for their operation.	Inf. L.
Of the self-contained type containing not over 25 pounds weight of gas, or of the remote-control type, consisting of separate units shipped separately and each containing not over 25 pounds weight of gas.	Inf. G or Non-inf. G.
Resin*	Haz.
Rifle powder. (See Black powder.)	
Road asphalt or tar:	
Liquid*	Inf. L.
Do.*	Comb. L.
Liquid (see also Asphalt)*.	Haz.
Road oil	Comb. L.
Rockets. (See Fireworks.)	
Roman candles. (See Fireworks.)	
Rosin (colophony)	Haz.
Rough ammonia tankages:	
Containing less than 7 percent moisture (see also Tankages).	Inf. S.
Containing 7 percent or more of moisture (see also Tankages).	Haz.
Rubber:	
Buffings	Inf. S.
Scrap, ground, powdered or granulated.	Do.
Shoddy, regenerated rubber, or reclaimed rubber.	Do.

Article	Classification
Rum, denatured. (See Alcohol, denatured.)	
Rust-preventive coating*	Comb. L.
Safety fuse	Expl. C.
Safety squibs	Do.
Saltpeter. (See Potassium nitrate.)	
Chile. (See Sodium nitrate.)	
Salutes. (See Fireworks.)	
Sawdust (when dry, clean and free from oil).	Haz.
Scheele's green, solid. (See Copper arsenite, solid.)	
Sea coal. (See Coal facings.)	Inf. S.
Shellac:	
Liquid. (See Paint, liquid.)	Inf. L.
Raw	Haz.
Shell fireworks. (See Fireworks.)	
Signals, highway. (See Fireworks.)	
Silicon chloride (tetrachloride).	Cor. L.
Sisal. (See Fibers.)	
Sludge acid	Do.
Small-arms:	
Ammunition (see also Ammunition for small arms).	Expl. C.
Ammunition, tear gas cartridges (see also Ammunition for small arms).	Do.
Primers	Do.
Smoke candles. (See Fireworks.)	
Smoke generators. (See Chemical ammunition, class B or C.)	
Smokeless powder:	
For cannon	Do.
For cannon or small arms in water.	Do.
For small arms	Do.
Smoke pots. (See Fireworks.)	
Sodium:	
Arsenate, solid	Pois. B.
Arsenite (solution) liquid.	Do.
Cacodylate, solid	Do.
Chlorate (see also Chlorates).	Oxy. M.
Chlorite (see also Calcium chlorite).	Do.
Dimethylarsenate (see also Sodium cacodylates, solid).	Pois. B.
Hydrosulfite	Inf. S.
Hydroxide. (See Caustic soda, solid.)	
Sodium—Continued.	
Hydroxide solution. (See Caustic soda, liquid.)	
Metallic	Inf. S.
Nitrate	Oxy. M.
Nitrite	Do.
Perchlorate. (See under Perchlorates.)	Do.
Permanganate. (See under Permanganates.)	Do.
Peroxide	Do.
Picramate, wet with 20 percent water.	Inf. S.
Sulfide	Do.
Solvent naphtha. (See Coal-tar naphtha.)	
Solvents, n. o. s.*	Comb. L.
Do*	Inf. L.
Sparklers. (See Fireworks.)	
Sparklets. (See Carbon dioxide siphon bulbs.)	
Spent mixed acid	Cor. L.
Spent sulfuric acid	Do.
Spirits of nitroglycerin. (See Nitroglycerin, spirits of.)	
Sporting powder. (See Black powder or smokeless powder for small-arms.)	
Spreader cartridges. (See Fireworks.)	
Squibs, electric or safety. (See Electric squibs or safety squibs.)	
Stick lac. (See Shellac, raw.)	
Stoddard solvent*	Comb. L.
Straw. (See Hay.)	
Strontium:	
Arsenite, solid	Pois. B.
Chlorate (see also Chlorates).	Oxy. M.
Wet (see also Chlorates, wet).	Do.
Nitrate	Do.
Strychnine and salts thereof, solid.	Pois B.
Styphnate of lead. (See Initiating explosive.)	
Sulfur:	
Flowers of sulfur, sulfur flowers, brimstone.	Haz.
Chloride (mono and di)	Cor. L.
Dioxide	Noninf. G.
Trioxide	Cor. L.
Sulfuric acid	Do.
Fuming (oleum) (nordhausen).	Do.
Syphon bottle charges. (See Carbon dioxide syphon bulbs.)	
Tankage fertilizers:	
Containing 8 percent or more of moisture. (See also Tankages.)	Haz.

Article	Classification
Tankage fertilizers—Continued.	
Containing less than 8 percent moisture. (See also Tankages.)	Inf. S.
Tank cars, empty*	Haz.
Tank trucks, empty*	Do.
Tar, liquid.* (See Road asphalt or tar liquid.)*	
Tear gas:	
Candles	Pois. C.
Cartridges. (See Ammunition for small-arms.)	
Material, liquid or solid, n. o. s.	Do.
Tetrachloride. (See also Silicon chloride.)	Cor. L.
Tetraethyl lead, liquid	Pois. B.
Tetrazene (guanyl nitrosamino guanyl tetrazene). (See Initiating explosive.)	
Tetryl. (See High explosive.)	
Textile waste (see also Cotton waste).	Haz.
Wet. (See Fibers, burnt, wet or damp.)	
Thallium:	
Salts, solid	Pois. B.
Sulfate, solid	Do.
Thinners for rust preventive coating.*	Comb. L.
Time fuzes	Expl. C.
Tin tetrachloride, anhydrous	Cor. L.
Titanium tetrachloride	Do.
Toluene	Inf. L.
Toluol. (See Toluene.)	
Torches. (See Fireworks.)	
Torpedoes:	
Cap. (See Fireworks.)	
Empty. (See Ammunition for cannon, nonexplosive.)	
Explosive. (See Explosive torpedoes.)	
Toy, railway or track. (See Fireworks.)	
Toy caps	Expl. C.
Tracer fuzes	Do.
Treated paper (manufactured articles properly dried to prevent spontaneous heating). (See also Oiled clothing.)	Haz.
Treated textiles (manufactured articles properly dried to prevent spontaneous heating). (See also Oiled clothing.)	Do.
Trinitrobenzene (see also High explosives):	
Wet (when wet with not less than 10 percent of water and in a quantity not exceeding 16 ounces in one outside package).	Inf. S.
Trinitroresorcinol. (See High explosives.)	
Trinitrotoluene (see also High explosives):	
Wet (when wet with not less than 10 percent of water and in a quantity not exceeding 16 ounces in one outside package).	Inf. S.
Turpentine	Comb. L.
Substitutes*	Do.
Do.*	Inf. L.
Unstable explosives	Prohibited.
Varnish* (see also Paint, liquid).	Inf. L.
Do.*	Comb. L.
Vermin exterminator. (See Insecticide liquid.)	
Very signal cartridges. (See Fireworks.)	
Waxes, liquid*	Do.
Wood filler, liquid* (see also Paint, liquid).	Inf. L.
Wood filler, liquid*	Comb. L.
Wood shavings (when dry, clean, and free from oil).	Haz.
Wood stain, liquid* (see also Paint, liquid).	Inf. L.
Wood stain, liquid	Comb. L.
Wool waste (see also Cotton waste):	
Wet. (See Fibers, burnt, wet, or damp.)	
X-ray film:	
Cellulose acetate base	No restrictions.
Nitrocellulose base. (See Photographic film.)	
X-ray film scrap:	
Cellulose acetate base	Do.
Nitrocellulose base. (See Pyroxylin plastic scrap.)	
Xylene*	Inf. L.
Xylol* (see also Xylene)	Do.
Xylol bromide	Pois. C.
Zinc:	
Arsenate	Pois. B.
Arsenite, solid	Do.
Chlorate (see under Chlorates).	Oxy. M.
Ethyl	Not permitted
Nitrate	Oxy. M.
Permanganate (see under Permanganates).	Do.
Zirconium:	
Metallic, dry	Inf. S.
Metallic, sludge	Do.
Metallic, wet	Do.
Nitrate	Oxy. M.
Picramate wet with 20 percent water.	Do.

ADDITIONAL REGULATIONS AND LAWS GOVERNING HANDLING, STOWAGE, AND TRANSPORTATION OF DANGEROUS GOODS

Shown below are the principal laws and regulations, or excerpts therefrom, which, in addition to the regulations of the United States Department of Commerce, Bureau of Marine Inspection and Navigation, govern the handling, stowage, and transportation of dangerous goods in ocean-borne trade. The United States "Carriage of Goods by Sea Act, 1936," which is reprinted in an appendix, should likewise be consulted. The reader is also referred to A Manual for the Safe Handling of Inflammable and Combustible Liquids, issued by the United States Department of Commerce, Bureau of Marine Inspection and Navigation, and to R. S. 4417a (46 U. S. C. 391a) which governs the carriage of petroleum and its products in bulk in tank vessels.

United States Laws

Section 4472, as amended, of the Revised Statutes, provides for the safe carriage of explosives or other dangerous or semidangerous articles or substances on board vessels.

The excerpt from the Merchant Marine Act of 1920, given below, stipulates that when certain vessels carry persons other than the crew, such persons must be notified of the presence on board of any dangerous articles.

Section 4472 of the Revised Statutes, as Amended (Effective April 9, 1941)

(1) The word "vessel" as used in this section shall include every vessel, domestic or foreign, regardless of character, tonnage, size, service, and whether self-propelled or not, on the navigable waters of the United States, including its Territories and possessions, but not including the Panama Canal Zone and the Philippine Islands, whether arriving or departing, or under way, moored, anchored, aground, or while in drydock; it shall not include any public vessel which is not engaged in commercial service, nor any vessel subject to the provisions of section 4417a of the Revised Statutes, as amended, which is constructed or converted for the principal purpose of carrying inflammable or combustible liquid cargo in bulk in its own tanks: *Provided*, That the provisions of subsection (3) of this section shall apply to every such vessel subject to the provisions of section 4417a of the Revised Statutes, as amended, which is constructed or converted for the principal purpose of carrying inflammable or combustible liquid cargo in bulk in its own tanks.

(2) The phrase "passenger-carrying vessel" as used in this section, when applied to a vessel subject to any provision of the International Convention for Safety of Life at Sea, 1929, means a vessel which carries or is authorized to carry more than twelve passengers.

(3) It shall be unlawful knowingly to transport, carry, convey, store, stow, or use on board any vessel fulminates or other detonating compounds in bulk in dry condition, or explosive compositions that ignite spontaneously or undergo marked decomposition when subjected for 48 consecutive hours to a temperature of 167° F., or compositions containing an ammonium salt and a chlorate, or other like explosives.

(4) It shall be unlawful knowingly to transport, carry, convey, store, stow, or use on board any passenger-carrying vessel any high explosives such as, and including, liquid nitroglycerin, dynamite, trinitrotoluene, picrates, detonating fuzes, fireworks that can be exploded en masse, or other explosives susceptible to detonation by a blasting cap or detonating fuse, except ships' signal and emergency equipment, and samples of such explosives (but not including liquid nitroglycerin) for laboratory or sales purposes in restricted quantities as may be permitted by regulations of the Secretary of Commerce established hereunder.

(5) It shall be unlawful knowingly to transport, carry, convey, store, stow, or use on board any vessel other than a passenger-carrying vessel, any high

explosive referred to in subsection (4) hereof except as permitted by the regulations of the Secretary of Commerce established hereunder.

(6) (a) It shall be unlawful knowingly to transport, carry, convey, store, stow, or use (except as fuel for its own machinery) on board any vessel, except one specifically exempted by paragraph (b) of this subsection, any other explosives or other dangerous articles or substances, including inflammable liquids, inflammable solids, oxidizing materials, corrosive liquids, compressed gases, poisonous articles or substances, hazardous articles, and ships' stores and supplies of a dangerous nature, except as permitted by the regulations of the Secretary of Commerce established hereunder: *Provided*, That all of the provisions of this subsection relating to the transportation, carrying, conveying, storing, stowing, or use of explosives or other dangerous articles or substances shall apply to the transportation, carrying, conveying, storing, stowing, or using on board any passenger vessel of any barrels, drums, or other packages of any combustible liquid which gives off inflammable vapors (as determined by flash point in open cup tester as used for test of burning oil) at or below a temperature of 150° F. and above 80° F.

(b) This subsection shall not apply to—

(i) Vessels not exceeding fifteen gross tons when not engaged in carrying passengers for hire;

(ii) Vessels used exclusively for pleasure;

(iii) Vessels not exceeding five hundred gross tons while engaged in the fisheries;

(iv) Tugs or towing vessels: *Provided, however*, That any such vessel, when engaged in towing any vessel that has explosives, inflammable liquids, or inflammable compressed gases on board on deck, shall be required to make such provisions to guard against and extinguish fire as shall be prescribed by the Board of Supervising Inspectors and approved by the Secretary of Commerce;

(v) Cable vessels, dredges, elevator vessels, fireboats, ice breakers, pile drivers, pilot boats, welding vessels, salvage and wrecking vessels;

(vi) Inflammable or combustible liquid cargo in bulk: *Provided, however*, That the handling and stowage of any inflammable or combustible liquid cargo in bulk shall be subject to the provisions of section 4417a of the Revised Statutes, as amended.

(7) In order to secure effective provisions against the hazards of health, life, limb, or property created by explosives or other dangerous articles or substances to which subsection (3), (4), (5), or (6) of this section apply—

(a) The Secretary of Commerce shall by regulations define, describe, name, and classify all explosives or other dangerous articles or substances, and shall establish such regulations as may be necessary to make effective the provisions of this section with respect to the descriptive names, packing, marking, labeling, and certification of such explosives or other dangerous articles or substances; with respect to the specifications of containers for explosives or other dangerous articles or substances; with respect to the marking and labeling of said containers; and shall accept and adopt for the purposes above mentioned in this subsection such definitions, descriptions, descriptive names, classifications, specifications of containers, packing, marking, labeling, and certification of explosives or other dangerous articles or substances to the extent as are or may be established from time to time by the Interstate Commerce Commission insofar as they apply to shippers by common carriers engaged in interstate or foreign commerce by water. The Secretary of Commerce shall also establish regulations with respect to the marking, handling, storage, stowage, and use of explosives or other dangerous articles or substances on board such vessels; with respect to the disposition of any explosives or other dangerous articles or substances found to be in an unsafe condition; with respect to the necessary shipping papers, manifests, cargo-stowage plans, and the description and descriptive names of explosives or other dangerous articles or substances to be entered in such shipping documents; also any other regulations for the safe transportation, carriage, conveyance, storage, stowage, or use of explosives or other dangerous articles or substances on board such vessels as the Secretary of Commerce shall deem necessary; and with respect to the inspection of all the foregoing mentioned in this paragraph. The Secretary of Commerce may utilize the services of the Bureau for the Safe Transportation of Explosives and Other Dangerous Articles, and of such other organizations whose services he may deem to be helpful.

(b) The transportation, carriage, conveyance, storage, stowage, or use of such explosives or other dangerous articles or substances shall be in accordance

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with the regulations so established, which shall, insofar as applicable to them, respectively, be binding upon shippers and the owners, charterers, agents, masters, or persons in charge of such vessels, and upon all other persons transporting, carrying, conveying, storing, stowing, or using on board any such vessels any explosives or other dangerous articles or substances: *Provided*, That this section shall not be construed to prevent the transportation of military or naval forces with their accompanying munitions of war and stores.

(c) Nothing contained in this section shall be construed to relieve any vessel subject to the provisions of this section from any other of the requirements of title 52 (secs. 4399 to 4500, inclusive) of the Revised Statutes or Acts amendatory or supplementary thereto and regulations thereunder applicable to such vessel, which are not inconsistent herewith.

(d) Nothing contained in this section shall be construed as preventing the enforcement of reasonable local regulations now in effect or hereafter adopted, which are not inconsistent or in conflict with this section or the regulations of the Secretary of Commerce established hereunder.

(8) Any master, owner, charterer, or agent shall refuse to transport any explosives or other dangerous articles or substances in violation of any provisions of this section and the regulations established thereunder, and may require that any container or package which he has reason to believe contains explosives or other dangerous articles or substances be opened to ascertain the facts.

(9) Before any regulations or any additions, alterations, amendments, or repeals thereof are made under the provisions of this section, except in an emergency, such proposed regulations shall be published and public hearings with respect thereto shall be held on such notice as the Secretary of Commerce deems advisable under the circumstances. Any additions, alterations, amendments, or repeals of such regulations shall, unless a shorter time is authorized by the Secretary of Commerce, take effect ninety days after their promulgation.

(10) It shall be unlawful knowingly to deliver or cause to be delivered, or tender for shipment to any vessel subject to this section any explosives or any other dangerous articles or substances defined in the regulations of the Secretary of Commerce established hereunder under any false or deceptive descriptive name, marking, invoice, shipping paper, or other declaration and without informing the agent of such vessel in writing of the true character thereof at or before the time of such delivery or transportation is made. It shall be unlawful for any person to tender for shipment, or ship on any vessel to which this section applies, any explosives or other dangerous articles or substances the transportation, carriage, conveyance, storage, stowage, or use of which on board vessels is prohibited by this section.

(11) The Secretary of Commerce may exempt any vessel or class of vessels from any of the provisions of this section or any regulations or parts thereof established hereunder upon a finding by him that the vessel, route, area of operations, conditions of the voyage, or other circumstances are such as to render the application of this section or any of the regulations established hereunder unnecessary for the purposes of safety: *Provided*, That except in an emergency such exception shall be made for any vessel or class of vessels only after a public hearing.

(12) The provisions of this section and the regulations established hereunder shall be enforced primarily by the Bureau of Marine Inspection and Navigation, of the Department of Commerce, and the Coast Guard, of the Department of the Treasury; and the Secretary of Commerce, with the consent of the head of any executive department, independent establishment, or other agency of the Government, may avail himself of the use of information, advice, services, facilities, officers, and employees thereof (including the field service) in carrying out the provisions of this section: *Provided*, That no officer or employee of the United States shall receive any additional compensation for such services, except as permitted by law.

(13) Any collector of customs may, upon his own knowledge, or upon the sworn information of any reputable citizen of the United States, that any vessel subject to this section is violating any of the provisions of this section or of the regulations established hereunder, by written order served on the master, person in charge of such vessel, or the owner or charterer thereof, or the agent of the owner or charterer, detain such vessel until such time as the provisions of this section and of the regulations established hereunder have been complied with. If the vessel be ordered detained, the master, person in charge, or owner or charterer, or the agent of the owner or charterer thereof, may within 5 days

appeal to the Secretary of Commerce, who may, after investigation, affirm, set aside, or modify the order of such collector. If any reputable citizen of the United States furnishes sworn information to any collector of customs that any vessel, subject to this section, is violating any of the provisions of this section or of the regulations established hereunder, and such information is knowingly false, the person so falsely swearing shall be deemed guilty of perjury.

(14) Whoever shall knowingly violate any of the provisions of this section or of any regulations established under this section shall be subject to a penalty of not more than $2,000 for each violation. In the case of any such violation on the part of the owner, charterer, agent, master, or person in charge of the vessel, such vessel shall be liable for the penalty and may be seized and proceeded against by way of libel in the district court of the United States in any district in which such vessel may be found.

(15) When the death or bodily injury of any person results from the violation of this section or any regulations made in pursuance thereof, the person or persons who shall have knowingly violated or caused to be violated such provisions or regulations shall be fined not more than $10,000 or imprisoned not more than ten years, or both.

(16) The transportation by vessels of gasoline or any other inflammable or combustible liquid or inflammable gas when carried by motor vehicles using the same as a source of their own motive power, or motive power for driving auxiliaries forming a part of the vehicle, shall be lawful under the conditions as set forth in the regulations established by the Secretary of Commerce under this section: *Provided, however*, That the motor or motors in any vehicle be stopped immediately after entering the said vessel, and that the same be not restarted until immediately before said vehicle shall leave the vessel after said vessel has been made fast to the wharf or ferry bridge at which she lands. All other fire, if any, in such vehicle shall be extinguished before entering the said vessel and the same shall not be relighted until after said vehicle shall leave the vessel: *Provided further*, That the Secretary of Commerce, may, by regulation, permit the operation on board vessels of motive power for driving auxiliaries forming a part of motor vehicles, under such conditions as he may deem proper: *Provided further*, That any owner, charterer, agent, master, or other person having charge of a vessel shall have the right to refuse to transport motor vehicles the fuel tanks of which contain gasoline or other inflammable or combustible liquid or inflammable gas used as a source of power for the vehicle or its auxiliaries: *Provided further*, That the owner, motor carrier, and operator of any such vehicle in which all fires have not been extinguished or the motor or motors stopped as required by this subsection or regulations established thereunder, and the owner, charterer, agent, master, or person in charge of the vessel on which such vehicle is transported, shall each be liable to a penalty of not more than $500, for which the motor vehicle and vessel, respectively, shall be liable: *And provided further*, That a violation of this subsection shall not subject any person to the penalty provided in subsection (14) or (15) hereof.

SEC. 2. (a) Such provision to guard against and extinguish fire shall be made on every vessel which is subject to the provisions of subsection (4), (5), or (6) of section 1 of this act, or of any other section of title 52 of the Revised Statutes, as amended (secs. 4399 to 4500, inclusive), or acts amendatory or supplementary thereto, as shall be prescribed by the Board of Supervising Inspectors and approved by the Secretary of Commerce.

(b) Nothing herein contained shall prohibit the use by any vessel of motorboats, launches, or lifeboats equipped with engines using an inflammable or combustible fuel, nor shall anything herein contained prohibit such motorboats, launches, or lifeboats from carrying such inflammable or combustible fuel in their tanks: *Provided*, That no such inflammable or combustible fuel for the engines of such motorboats, launches, or lifeboats shall be carried except as may be prescribed by regulations of the Board of Supervising Inspectors with the approval of the Secretary of Commerce: *Provided further*, That the use of such lifeboats shall be under such regulations as shall be prescribed by the Board of Supervising Inspectors with the approval of the Secretary of Commerce.

SEC. 3. Section 4417a of the Revised Statutes (U. S. C., 1934 edition, title 46, sup. V, sec. 391a) is hereby amended by deleting from paragraph 2 thereof the following proviso: "*Provided*, That the provisions of this section shall not apply to common carriers engaged in interstate or foreign commerce which transport such liquid cargo by water insofar only as such common carriers are subject to the regulations formulated by the Interstate Commerce Commission under the provisions of section 233 of the act of March 4, 1909 (ch. 321, 35 Stat. 1135), as

amended (18 U. S. C. 383);" and by amending the second proviso in paragraph 4 thereof to read as follows: "*And provided further*, That no permit shall be issued under the provisions of this section authorizing the presence on board any vessel of any of the materials expressly prohibited from being thereon by subsection (3) of section 4472 of the Revised Statutes, as amended."

Excerpt From the Merchant Marine Act, 1920

Cargo vessels documented under the laws of the United States may carry not to exceed 16 persons in addition to the crew between any ports or places in the United States or its Districts, Territories, or possessions, or between any such port or place and any foreign port, or from any foreign port to another foreign port, and such vessels shall not be held to be "passenger vessels" or "vessels carrying passengers" within the meaning of the inspection laws and the rules and regulations thereunder; *Provided*, That nothing herein shall be taken to exempt such vessels from the laws, rules, and regulations respecting life-saving equipment; *Provided further*, That when any such vessel carries persons other than the crew as herein provided for, the owner, agent, or master of the vessel shall first notify such persons of the presence on board of any dangerous articles, as defined by law, or of any other condition or circumstance which would constitute a risk of safety for passenger or crew.

The privilege bestowed by this section on vessels of the United States shall be extended insofar as the foreign trade is concerned to the cargo vessels of any nation which allows the like privilege to cargo vessels of the United States in trades not restricted to vessels under its own flag.

Failure on the part of the owner, agent, or master of the vessel to give such notice shall subject the vessel to a penalty of $500, which may be mitigated or remitted by the Secretary of Commerce upon a proper representation of the facts (sec. 26, act of June 5, 1920, 41 Stat. 998).

BRITISH LAWS AND REGULATIONS

In 1933 the British Board of Trade published a report of the Departmental Committee appointed by the Board of Trade to consider the existing Board of Trade memorandum on the "Carriage of Dangerous Goods and Explosives in Ships." This publication was reprinted in 1937 and may be secured by application to the British Library of Information, 50 Rockefeller Plaza, New York, N. Y., or H. M. Stationery Office, Adastral House, Kingsway, London, W. C. 2.

This report and the regulations of the United States Department of Commerce, Bureau of Marine Inspection and Navigation, closely parallel one another in their treatment of transportation of dangerous articles. However, as may be expected, there are some differences in the two sets of regulations. Shipowners and others interested should secure copies of this report, together with any memoranda, in the way of rulings, additional thereto that are published by the Board of Trade.

The provisions of the British Merchant Shipping Act of 1894 are somewhat similar to the United States laws. Section 301 prohibits the clearance of any emigrant ships (a ship that carries 50 or more steerage passengers), if there is on board (a) as cargo, any explosive, vitriol, lucifer matches, guano, or green hides; (b) as cargo or ballast, any article which in the opinion of the emigration officer is likely to endanger the health or lives of the passengers or the safety of the ship; (c) as cargo, any animals unless carried according to regulations laid down in the act.

Section 446 prohibits the shipment or carriage in *any vessel* of aqua fortis, vitriol, naphtha, benzine, gunpowder, lucifer matches, nitroglycerine, petroleum, explosives, or any other goods of a dangerous

nature, unless they are distinctly marked and notice is given of the nature and the shipper of the goods.

Sections 459 and 462 provide for the detention of an unsafe vessel.

Whenever cargo, in regard to which there are any doubts, is offered for shipment on a vessel subject to British laws and regulations, its loading should not be proceeded with until such doubts are definitely removed by reference to officially appointed surveyors or inspectors or other competent authority, and in this connection the following extract from the Merchant Shipping Act of 1894 should be borne in mind:

448. (1) The master or owner of any vessel, British or foreign, may refuse to take on board any package or parcel which he suspects to contain any dangerous goods and may require it to be opened to ascertain the fact.

The Merchant Shipping Act is, however, only one part of the British law. The Petroleum Acts, the Explosive Substance Acts, Orders in Council, Admiralty rules, recommendations of the Home Office, and the report, memoranda, and rulings of the Board of Trade give additional information and regulation.

Articles Ruled Upon By the Great Britain Board of Trade

The Board of Trade holds somewhat the same power over the shipment of dangerous goods as the United States Department of Commerce, Bureau of Marine Inspection and Navigation, does in this country. It has issued memoranda and rulings on the following commodities, and those who are engaged in the shipment of these commodities should consult the publications previously referred to for complete information:

PARTIAL BRITISH LIST OF DANGEROUS GOODS

The following list is taken from the report, "Carriage of Dangerous Goods and Explosives in Ships," prepared by the British Board of Trade.

[NOTE.—This list is not to be considered as containing a full list of dangerous goods and the noninclusion of any substance possessing dangerous properties is not to be held to relieve the persons concerned from responsibility for proper packing and stowage.]

Accellerene.
Acetic acid, glacial, strength 80 to 90 percent.
Acetone.
Acetylene.
Alkali metals (potassium and sodium, metallic).
Alkaline earth metals (barium, metallic).
Alsimin (aluminium ferrosilicon).
Aluminium:
- Bronze.
- Chloride.
- Ferrosilicon.
- Granulated or powder.

Ammonia, aqueous solutions of.
Ammonia:
- Liquefied anhydrous.
- Liquefied for use in ice machines.

Ammonium:
- Bichromate.
- Fluoride.
- Nitrate.
- Perchlorate.
- Permanganate.

Ammunition
Amyl:
- Acetate.
- Alcohol.

Aniline:
- Oil.
- Salt.

Antimony, and preparations thereof.
Antimony, chloride.
Aqua fortis (nitric acid).
Argon (compressed "permanent" gas).
Arsenic, and its preparations.
Asphalt.
Asphalted cloth.
Barium:
- Chlorate.
- Compounds of.
- Metallic.
- Nitrate.
- Oxide.
- Permanganate.
- Peroxide.

Bengal matches.
Benzine (petroleum spirit).
Benzol (petroleum spirit).

Benzolene (petroleum spirit).
Bichromates.
Bisulfide of carbon.
Bituminous paints.
Bleaching powder.
Boot creams (polishes).
Brattice cloth.
Bromates.
Bromine.
Bronze powder.
Butyl:
  Acetate.
  Alcohol.
Calcium:
  Azide.
  Carbide.
  Chlorate solution.
  Cyanamide.
  Metallic.
  Phosphide.
  Silicide.
Carbide of calcium.
Carbolic acid.
Carbon:
  Dioxide (liquefied gas).
  Disulfide (bisulfide of carbon).
  Monoxide (compressed "permanent" gas).
  Papers.
  Tetrachloride.
Caustic potash.
Caustic soda.
Celluloid:
  Solution.
  Enamels and lacquers.
Chemicals and medicinal preparations (in limited quantities in mixed consignments).
Chili—saltpeter (sodium nitrate).
Chlorates.
Chlorate mixture.
Chloride of lime (bleaching powder).
Chlorine (liquefied gas).
Chloroform.
Chromic acid.
Coal gas (compressed "permanent" gas).
Coal tar.
Cold starters.
Collodion cotton:
  Explosive.
  In solution in, or wet with inflammable liquids.
Compressed "permanent" gases.
Copper sulfate.
Copra.
Corrosive sublimate (mercuric chloride).
Creosote salts (naphthalene).
Cresylic acid (carbolic acid).
Cyanides.
Dampcourses.
Diacetone alcohol.
Dichlorethylene.
Dinitrobenzol.
Dinitrophenol, explosive and not explosive.
Dinitrotoluol.
Disinfectant fluids.
Dissolved gases.
Dye intermediates.
Ethane tetrachloride.
Ether (sulfuric).
Ethyl:
  Acetate.
  Alcohol.
  Chloride (liquefied gas).
  Fluid.
  Lactate.
Ethylene (liquefied gas).
Explosives.
Felt.
Felt, inodorous.
Ferrosilicon.
Films.
Fireworks.
Fulminates.
Gasoline (petroleum spirit).
Glue pieces.
Gunpowder.
Gutta-percha and India rubber solution.
Helium (compressed "permanent" gas).
Hydrobromic acid.
Hydrochloric acid.
Hydrocyanic acid.
Hydrofluoric acid.
Hydrogen:
  Compressed "permanent" gas.
  Peroxide.
Kerosene.
Lampblack.
Lead tetraethyl.
Lime:
  Hydrated or slaked.
  Quick or unslaked.
Liquefied gases.
Lucifer matches.
Lythene (petroleum spirit).
Magnesium metal:
  Ingots or sticks.
  Powder.
  Ribbon.
Matches.
Mercuric chloride.
Metaphenylenediamine (dye intermediate).
Metatoluolenediamine (dye intermediate).
Methane (compressed "permanent" gas).
Methyl alcohol.
Methyl chloride (liquefied gas).
Methylated spirit.
Mineral oil.
Mirbane oil (nitrobenzol).
Motor spirit (petroleum spirit).
Muriatic acid (hydrochloric acid).
Naphtha (petroleum spirit).
Naphthalene, crude and refined.
Neon (compressed "permanent" gas).
Nickel carbonyl.
Nicotine.
Nitrates.

Nitrate mixture.
Niter cake.
Nitric acid.
Nitric acid and sulfuric acid mixtures.
Nitrobenzol.
Nitrogen (compressed "permanent" gas).
Nitrolim (calcium cyanamide).
Nitrous oxide (liquefied gas).
Nitrocellulose films.
Nitro-compounds.
Nordhausen (sulfuric acid).
Oiled material.
Oleum (fuming sulfuric acid).
Orthonitrotoluol (dye intermediate).
Orthotoluidine (dye intermediate).
Oxalic acid.
Oxide of iron, spent.
Oxygen (compressed "permanent" gas).
Oxygen, liquefied.
Paints.
Paraffin.
Paranitrophenol (dye intermediate).
Paranitrosodimethylaniline.
Paranitrotoluol (dye intermediate).
Pentachlorethane.
Perborates.
Percarbonates.
Perchlorates.
Perchlorethylene.
Permanganates.
Peroxides.
Petroleum spirit.
Phenol (carbolic acid).
Phosgene (liquefied gas).
Phosphide of calcium.
Phosphoric acid.
Phosphorus:
- Amorphous.
- Sulfides of.
- White, yellow, or stick.

Photogravure printing inks.
Picric acid, explosive and not explosive.
Poisonous substances.
Polishes, boot cream, linoleum and liquid metal polish, etc.
Potassium:
- Bichromate.
- Bromate.
- Chlorate.
- Cyanide.
- Hydroxide—See caustic potash.
- Metallic.
- Nitrate.
- Perchlorate.
- Permanganate.
- Sulfide of.

Propyl alcohol.
Prussic acid (hydrocyanic acid).
Pyridine.
Roofing, saturated.
Rosin.
Rosin oil.
Safety matches.
Saltpeter (potassium nitrate).
Shale oil.
Sheep dips.
Ships' compositions.
Sodium:
- Azide.
- Bichromate.
- Bisulfite solution.
- Chlorate.
- Cyanide.
- Hydroxide.
- Metabisulfite.
- Metallic.
- Monoxide.
- Nitrate.
- Perborate.
- Percarbonate.
- Peroxide.
- Sulfide.

Spirits of wine (ethyl alcohol).
Stannic chloride (anhydrous) (tin tetrachloride).
Sulfate of copper.
Sulfur:
- Dioxide (liquefied gas).
- Monochloride.

Sulfuric acid.
Sulfuric acid and nitric acid mixtures.
Sulfurous acid.
Sulfuryl chloride.
Tar oil compounds.
Tetrachlorethane (ethane tetrachloride).
Thionyl chloride.
Tin tetrachloride (anhydrous).
Titanium tetrachloride.
Toe puffs.
Toluol (petroleum spirit).
Trichlorethylene.
Turpentine.
Varnishes, oil, spirit.
Vestas (lucifer matches).
Westron (ethane tetrachloride).
Westrosal (trichlorethylene).
White spirit (turpentine substitute).
Xylidine (dye intermediate).
Xylol (petroleum spirit).
Xylonite.
Zinc, granulated, powder, or dust.

PANAMA CANAL REGULATIONS

(*Extracts from Rules and Regulations Governing Navigation of the Panama Canal and Adjacent Waters. Supplement No. 18—December 15, 1940*)

Vessels carrying explosives, except ships of war, shall furnish a statement of the amounts and character of the explosives carried.

Upon the arrival of a vessel carrying explosive cargo at a port of the Panama Canal, the Master shall deliver to the Inspecting Officer a loading certificate issued by a Surveyor or Inspector of a recognized authority such as the Board

of Underwriters of New York, British Board of Trade, Port Authority Official, or Navigation Inspector, stating where and how the explosives are stowed and the manner of packing. When no loading certificate is available, the Master upon arrival, must submit to the Inspecting Officer a declaration as follows:

DECLARATION OF EXPLOSIVE CARGO CARRIED

I, the undersigned--------------------, Master of the------------------, carrying explosives as classified by the Interstate Commerce Commission of the United States, or by any other recognized government agency, do hereby declare and certify on behalf of the owners of the vessel, as follows:

The explosives were loaded at (1)------------------, packed and stowed in accordance with (2)------------------.

The Explosives are in (3)------------------.

Explosives are separated from inflammables by (4)------------------.

The packing and stowing has not been disturbed since leaving the port of (1)------------------.

(Master's signature)

(Date)

(1) Name of port of loading.
(2) Regulations of Board of New York Underwriters, British Board of Trade, Port Authority, as the case may be, as indicated on the containers.
(3) State number of hold, special magazine, etc. (which must be within reach of ship's fire hose), including amount of each kind of explosive.
(4) Boiler room, engine room, etc., within reach of ship's fire hose. If no inflammables are carried, so state.

The definition and classification of explosives and other hazardous cargoes shall be in accordance with the regulations established by the United States Interstate Commerce Commission or by any other recognized government agency, provided that decisions in case of doubt as to the explosive nature of any commodity, as well as to its classification, shall be made by the Governor or through an authority designated by him.

Packing and stowing of explosives and other hazardous cargoes must be in accordance with the rules in force at the port of loading. When no such rules exist at the port of loading, the regulations of the Board of Underwriters of New York, or of the British Board of Trade, shall apply.

The following areas for ships loaded with explosives or with highly volatile products are designated:

ATLANTIC END: Area included in rectangle one thousand yards wide immediately south of West Breakwater, starting at a point on West Breakwater one thousand yards from West Breakwater Light and thence extending westward two thousand yards along breakwater.

PACIFIC END: Area south of Naos Island bounded on the east by a line drawn south (true) from entrance gas buoy No. 1; on the south by a line drawn east (true) from Tortolita Island, and on the north and west by the curve of thirty-foot depth.

Vessels carrying explosive cargoes shall anchor in the explosive anchorage area on arrival at the Canal Zone, and there await instructions. Such vessels will be allowed alongside wharves of the Canal Zone only as prescribed in Regulation 88.A–7 and 88.A–8 (the two following regulations), and each case will be handled individually by the Port Captain concerned.

Vessels with explosives aboard forming part of the cargo will be allowed alongside the terminal piers only when such explosives are stowed properly in spaces which need not be opened during the vessel's stay at the dock. Should there be cargo for discharge at the Canal Zone in the same space with explosives, the explosives must be removed before the vessel will be allowed alongside the terminal piers.

The explosive dock at Mindi is designated for discharging explosives. Explosive cargoes consigned to the Panama Canal, or to military or naval units in the Canal Zone, or to private consignees, will be discharged at the explosives dock at Mindi or in explosive anchorages prescribed in Regulation 88.A–5, except that ships may discharge explosive cargoes at Coco Solo if approval of such discharge is given by the Commandant of the 15th Naval District; and, except that the Governor will consider applications to discharge explosives at Panama Canal docks in an emergency or when the character or packing of the explosives justifies.

Shipments of ammunition for small arms (in cartridge or shell fully assembled) not exceeding in the aggregate 10 tons weight or measurement and pyrotechnic supplies not exceeding in the aggregate 1 ton weight or measurement, may be landed at either the Cristobal or Balboa terminal docks upon observance of special precautions to insure safe landing.

Whenever it shall become necessary to remove any especially inflammable cargo from ships to public wharves in the Canal Zone, the Port Captain shall be notified at least 2 hours before such cargo is to be discharged upon the wharf, so that the proper means can be provided to dispose of this class of material at the earliest moment.

Hazardous Cargo, Other Than Explosives

For the purpose of these regulations, inflammable liquids and combustible liquids shall be classified, in accordance with their vapor pressures and flash points, into grades A, B, C, D, and E, as classified by the Bureau of Marine Inspection and Navigation of the United States Department of Commerce, as follows:

Grade A.—Inflammable liquids having a Reid Vapor Pressure of 14 pounds per square inch or more.

Grade B.—Inflammable liquids having a Reid Vapor Pressure of under 14 pounds and over 8½ pounds per square inch.

Grade C.—Inflammable liquids having a Reid Vapor Pressure of 8½ pounds per square inch or less and a flash point of 80° F. or below.

Grade D.—Combustible liquids having a flash point below 150° F. and over 80° F.

Grade E.—Combustible liquids having a flash point of 150° F. or above.

The transportation of Grade A products in shelter deck vessels is prohibited.

The transportation of Grade B and C products in shelter deck vessels (i. e. vessels having a shelter 'tween-deck space located over tanks and not adapted or used for carrying hazardous cargo in bulk) is prohibited unless such vessels are provided with a side-to-side and deck-to-deck gas-tight, all-steel bulkhead at each end of this space separating it from the other parts of the vessel. There shall be no automatic relief valves or vent outlets in this 'tween-deck space; ullage plugs must be secured and sealed in such maner as to necessitate the breaking of the seal in opening them.

Vessels carrying a full cargo of grade A, B, C, or D products in containers shall conform to the regulations for packing and stowing as established by the United States Interstate Commerce Commission or by any other recognized governmental agency, as well as the regulations of the Panama Canal for vessels carrying bulk cargoes of such grades, as far as practicable.

Vessels carrying a part cargo of grade A, B, or C products in containers shall comply with Regulation 88.C–3 (the regulation immediately above) as well as with the following: Submit loading certificate as required in Regulation 88.A–2, stating where and how the inflammables are stowed and the manner of packing as indicated on the containers.

No pitch, tar, turpentine, or other combustible shall be boiled on any pier or on board any vessel without permission of the Port Captain.

SUEZ CANAL REGULATIONS

(*Extracts from 1940 Rules of Navigation for Ships Carrying Dangerous Materials Through the Suez Maritime Canal*)

ARTICLE 1

PAR. 1. In the three categories of dangerous materials specified in the following paragraphs, the Canal Company has only included the materials which are transported with some frequency through the Canal, but it reserves to itself the right to add all other products, the handling or conveyance of which may appear to be dangerous.

PAR. 2. First category.—Explosives and other very dangerous materials, the transport of which requires the greatest precautions:

Ammoncarbonite.
Ammunition and other engines of war.
Cartridges, war, sporting and mining.
Chlorates and combustible materials, mixtures of.
Detonators.

Detonators for Christmas crackers.
Dynamite.
Fireworks.
Fulminates, pure or diluted.
Fuses, mining, fitted with detonators or other means of ignition.
Gun cotton, dry (less than 35 percent moisture).
Lynite.
Nitrated cotton (for collodion) pyroxylin.
Nitroglycerin.
Picrates.
Picric acid, ordinary.
Percussion caps, fulminate.
Powder.
Pyroxylin, nitrated cotton (for collodion).
Sodium.
Tetra-nitro-methyl-aniline.
Trinitro-acetaldehyde.

Generally all products specified on the various governments lists of authorized explosives (for instance, the list of authorized explosives issued yearly by the British Home Office), with the exception of "*Safety ammunition*," recognized as such by the various governments, which, although they are explosives, are included in the second category below (for instance, in the British List of Authorized Explosives, class 6, division 1, safety cartridges section 108, safety fuses, railway fog signals, percussion caps: O. in C. No. 1).

PAR. 3.—Second category.—Very inflammable or burning materials, the transport of which requires special precautions:

Acetylene.
Acetone.
Alcohols, industrial.
Ammunition, safety.
Amyl acetate.
Barium peroxide.
Bengal fireworks.
Bengal matches.
Calcium:
  Acetate
  Carbide of
Carbon bisufide
Celluloid made from nitrocellulose.
Chlorine.
Christmas crackers, complete.
Collodion:
  Cotton damp at 35 percent of butanol.
  Liquid.
Ethers.
Ethyl chloride.
Ferrosilicon containing between 30 and 70 percent silicon.
Guncotton, damp (more than 35 percent moisture).
Hydrogen peroxide.
Magnesium, in powder.
Magnesium light-buoys.
Methanol.
Methyl chloride.
Nitrates and saltpeter, crude or refined, in bags.
Paint for ships' bottoms or aeroplanes.
Percussion caps for toys.
Phosphorous:
  White.
  Yellow.
Potassium chlorate.
Saltpeter.
Saltpeter and nitrates, crude or refined, in bags.
Sodium peroxide.
Spirit varnish.
Varnish for ships' bottoms and aeroplanes.
Zinc powder.

PAR. 4. Third category.—Inflammable or dangerous materials:

Acetic acid, glacial.
Alcohol (spirits).
Anyhydrous ammonia.
Bitumen.
Bromine.
Carbon tetrachloride.
Caustic soda.
Copra.
Cotton in bales or raw.
Creosote.
Cyanamide.
Cyanide of potassium.
Cyanide of sodium.
Ferrosilicon containing between 15 and 30 percent and between 70 and 80 percent silicon.
Fibers.
Formaldehyde.
Gas:
  Compressed, cylinders of.
  Tear.
Gunnies.
Hay
Hemp.
Hydrochloric acid.
Jute.
Matches.*
Napthalene.
Nitrates and saltpeter, crude or refined, in barrels.
Nitric acid, monohydrate.
Picric acid mixed with 50 percent water.
Pitch.

*Safety matches, the nature and packing of which have been certified in writing by the authorities of the port of loading, are considered ordinary nondangerous cargo.

Phosphorous, red or amorphous.
Saltpeter and nitrates, crude or refined, in barrels.
Spirits (alcohol).
Straw.
Sulfur.
Sulfuric acid.
Tar.
Tow.
Wastes, greasy, of wool, cotton, hemp, jute, flax.
Wax.
Wool in bales or raw.

ARTICLE 2

Ships Carrying Dangerous Cargoes in Small Quantities

Ships carrying no more than 3,000 kilos[3] of dangerous materials of each of the three categories are deemed to be ordinary ships, i. e., without any dangerous cargo, provided they satisfy the following conditions:

(a) Prescriptions of article 4, paragraph L and article 5.

(b) If the cargo includes materials of the first category, the whole of such materials shall be stowed in special holds with tight and incombustible walls and capable of being quickly flooded.[1]

(c) If the ship carries materials of the second category, complete isolation of such materials from the other cargo is necessary. Safety ammunition shall be separated absolutely from the inflammables.

The said ships shall still be deemed to be ordinary ships when, besides the 9,000 kilos of the three categories, they also carry (in cases or drums) 3,000 kilos of benzine and 3,000 kilos of ordinary petroleum in the conditions of Article 13.

(1) Important Notice.—It is to be understood that both the prescriptions of this paragraph and those of article 4 (especially with regard to Rules of loading) shall be complied with concurrently. For instance, the Board of Trade specifies that explosives other than fulminates must not be stowed in the same compartments with fulminates, nor with ammunition and fireworks fitted with fulminate detonators. It follows that a ship carrying at the same time fulminates and other explosives (no more than 3,000 kilos in all) shall not enjoy the benefit of article 2 unless she has at least two special holds permitting of the separation of the fulminates from the other explosives. But if the ship has only one special hold, she shall not enjoy the benefit of article 2, and her admittance to the Canal shall be subject to her complying with the various prescriptions of the present rules.

Also, a ship with a cargo of dangerous materials of whatever nature may carry, in the conditions of the present article, a maximum of 3,000 kilos of each of the other categories and petroleum, without involving a change in the treatment due her by reason of her main cargo.

ARTICLE 3

Mixed Cargoes, Prohibitions of Transit

Access to the Canal and to its ports is forbidden to ships carrying in any other manner than stated in Article 2 the following cargoes:

1. First category materials with benzine or ordinary petroleum in bulk.
2. Second or third category materials with benzine or ordinary petroleum in bulk. (However, for a cargo of this description, access to the Canal ports and permission to transit may be granted in certain cases if application is made to the Canal Company in Egypt before the loading of the ship.)
3. First category materials with benzine in receptacles.
4. More than 300 tons, exclusive of packing and (in case of shells and ammunition) of metal, of first category materials with second or third category materials[4] or ordinary petroleum in receptacles.

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[3] 3,000 kilograms packing not included; and in case of shells and ammunition, weight of metal not included.

[4] Although safety ammunition is included in the second category, a cargo the dangerous materials of which consist solely of first category and safety ammunition, will be treated as a cargo of one category and not as a mixed cargo. The ship will therefore have to comply with the conditions of the following articles.

ARTICLE 4

Packing and Stowage

PAR. 1. The packing and stowage must be in accordance with the rules in force at the port of loading. When no such rules exist at the port of loading, the British Board of Trade rules will apply (Appendix to the Report on the Carriage of Dangerous Goods and Explosives in Ships, 1933).

PAR. 2. Further, the packing and stowage must be in accordance with other conditions varying with the nature of the dangerous materials carried.

(a) Ships whose dangerous cargo consists solely of first category materials with or without safety ammunition.

No limitation as to quantity. Explosives other than fulminates shall not be stowed in the same compartment with fulminates nor with ammunition and fireworks, etc., fitted with fulminate detonators.

(b) Ships whose dangerous cargo consists solely of second and third category materials.

No limitation as to quantity. No other conditions but those of paragraph 1 excepting that the separation between safety ammunition and second or third category materials must be absolute.

(c) Ships carrying at the same time first category materials and second and third category materials.

No limitation as to quantity for second and third category materials. The weight of first category materials, exclusive of packing and (in case of shells) of metal, must not exceed 300 tons. The separation between first category materials and second and third category materials must be absolute. In this connection safety ammunition is to be treated as, and can be stowed with, first category materials but must always be absolutely separated from other second or third category materials.

If the first category materials are not in a special hold which is water-tight and capable of being quickly flooded from the outside, they must be in a portion of the ship opposite to the second or third category materials, that is to say in such a position that either the boilers and engine room, or at least a hold containing materials which are as near as possible noncombustible, are between them and the second and third category materials. A water-tight bulkhead is not sufficient.[5]

Explosives, other than fulminates, shall not be stowed in the same compartment as fulminates nor with ammunition and fireworks, etc., fitted with fulminate detonators.

ARTICLE 5

Certificate and Declaration

PAR. 1. Ships carrying dangerous materials of first or second category.

The captain shall hand to the company's officials a certificate concerning the packing and stowage of the said dangerous materials.

This certificate should be signed whenever possible by an official authority of the port of loading (for instance, P. L. A. explosives Inspector's Certificate filled in and signed in London for ships carrying explosives by the inspector of the Port of London Authority, who hands the original to the captain).

When it is not possible to obtain the signature of an official authority of the port of loading, the certificate must be replaced by a list of particulars concerning the packing and stowage of the dangerous materials and signed by the shipowner or his representative at the port of loading.

Should this document fail to prove in every way reliable or omit any required details the Canal Company reserves the right to take all extra precautions which, in the opinion of the company's officials, may seem necessary to best ensure the safety of shipping generally; accordingly, the ship may be stopped at the terminal ports of the Canal and subjected to a detailed examination of the cargo, which may delay transit.

If the information supplied is found to be incorrect, access to the Canal may be forbidden. Further, the Captain must also furnish a signed declaration as per Form E (Appendix No. 1) which he will receive through the pilot.

PAR. 2. Ships carrying dangerous materials of third category (but none of the first or second category).

[5] A water-tight bulkhead is sufficient to separate explosives from caustic soda.

The certificate mentioned in the preceding paragraph is not necessary. The declaration E signed by the captain on reaching the Canal is sufficient.

ARICLE 6

Permission to Enter the Terminal Ports of the Canal, to Take in Provisions and Fuel, and to Transit Through the Canal

Ships which comply with the conditions of articles 3 A (types of ships), 4 (packing and stowage), and 5 (certificate and declaration) may enter the Canal ports, take in provisions and fuel and transit the Canal. When taking in provisions or fuel they must begin the necessary operations at once, carry them out as quickly as possible, and be ready to enter the Canal immediately afterwards. Except in case of force majeure, of which the Canal Company shall be sole judge, such operations shall not last more than 12 hours.

ARTICLE 7

Permission to Handle Cargo

PAR. 1. Ships carrying materials of the first category. Handling of cargo not allowed.

PAR. 2. Ships carrying materials of the second and third categories, but none of the first category.

Handling of cargo allowed. The conditions are as follows: Ship to be isolated in the Outer Harbour Basin or in the roads at Port Thewfik when second-category materials are carried.

ARTICLE 8

Permission to Carry Out Repairs

Ships carrying dangerous materials, which in virtue of articles 7 are allowed to handle cargo, are alone authorized to carry out repairs. Ships which, whilst complying with the conditions for entering the Canal ports, taking in provisions and fuel and transiting, are nevertheless not allowed to handle cargo, are only allowed to carry out repairs in case of force majeure. The Canal Company shall be sole judge as to whether or not a case is of force majeure.

ARTICLE 9

Notice of Arrival

PAR. 1. Notice of arrival of any ship carrying dangerous materials, sent b ythe owner or his representative, must reach the Suez Canal Company in Egypt in advance. For ships carrying materials of the first or second category, such notice must give the particulars specified in declaration E (Appendix No. 1) and must reach the Canal 4 days in advance of the ship. For ships carrying materials of the third category, such notice need only reach the Canal 24 hours in advance and indicate the total quantity of said materials, the probable length of stay in the Canal ports, and which cargo it is intended to load or unload.

PAR. 2. *Radiotelegram.*—Such notice shall be confirmed by wireless as prescribed in Article 7 of the Rules of Navigation, stating hour of arrival; but it is not necessary to repeat the details already given in the notice. If the wireless message can reach the Canal Company within the time specified in the preceding paragraph, it can serve in lieu of the notice but must then give all the required details.

PAR. 3. Should these notices not be received in time, delay to the ship may result.

ARTICLE 10

Arrival

PAR. 1. Except in case of force majeure, a ship carrying materials of the first category shall arrive at the Canal terminal ports by day only, preferably at sunrise. Ships carrying materials of the second or third category may arrive at any time.

PAR. 2. If a ship carries dangerous materials the captain must state the fact to the pilot as soon as he arrives on board; then the captain must comply with article 5 concerning declaration E and port of loading certificate.

PAR. 3. Any ship carrying dangerous materials must hoist, before entering the Outer Harbour, the signal indicated by the pilot.

PAR. 4. Any ship carrying dangerous materials shall be assigned a special berth or mooring place. Such place will be selected by the company's officials according to the information sent in advance and the declaration of the captain.

PAR. 5. When, through failing to comply with paragraph 2 above, a ship has been given a berth where she must not stay by reason of her dangerous cargo, the change of berth shall be at the ship's cost. (See art. 11, par. 3, of the Rules of Navigation.)

PAR. 6. *Control.*—The Captain of any ship carrying dangerous materials must not only give all the information specified in the preceding paragraph to the company's officials, but also help them by all possible means to inspect on board the packing and stowage of the dangerous materials. The Canal Company reserves its right, after such inspection, to refuse transit if sufficient precautions have not been taken to obviate any danger of fire during the ship's stay in the Canal or its ports.

ARTICLE 11

Precautions on Board

During the whole of their stay in the Canal and its ports, ships carrying dangerous materials (first, second, or third category) shall comply with the instructions of Appendix No. 2 for their respective categories.

FRESH FRUITS CARRIED UNDER VENTILATION

Great quantities of fresh or "green" fruits are carried today by refrigerated vessels, but there is still a considerable amount of fruit carried from certain regions in uninsulated vessels, many of which were specially designed for this trade, or in ordinary cargo vessels. Apples are carried from Canada and the United States without refrigeration, and other cargoes include oranges, lemons, grapes, etc., from numerous Mediterranean ports and from the Canary Islands and other North Atlantic islands. These shipments probably comprise most of the fruit shipped in uninsulated vessels, although there are occasional shipments from the West Indies and a few other regions.

Good ventilation is the chief requisite for fruit of this nature, since, no matter what condition fruit is in when shipped, decomposition will set in if there is not sufficient ventilation. In some cases, lack of ventilation, even for a few hours, has spoiled an entire cargo. During loading the hatches should be left off as much as possible to permit the circulation of a continuous current of air to the bottom of the hold to get rid of the gases generated by the fruit. Hatches should also be kept off as much as possible during the voyage.

The usual method of ventilation is by means of large vertical air shafts constructed of boards and cases extending from the hatchways and under-side of ventilators to the bottom of the holds, where they connect with air passages left between the cases, leading to the sides of the ship. Other similar air passages run fore and aft and connect with the system of thwartship and vertical passages.

Additional ventilation is obtained by stowing the boxes of fruit loosely, leaving 8 to 10 inches between the boxes and the bulkheads, ending the stowage 8 to 10 inches below the deck beams, and laying

laths athwartship between the tiers of boxes. 'Tween-deck stowage should be employed as much as possible, owing to the difficulty of ventilating the lower holds.

Green fruit should not be stowed next to or over any cargo that is liable to heat or give off odors, since such cargo will damage the fruit. Certain other cargo, moreover, should not be stowed with or near green fruit, since the fruit may damage it. Such cargo includes delicate foodstuffs, such as tea, flour, macaroni, coffee, eggs, dried fish, and macaroni.

Bananas are most commonly carried in specially designed vessels at certain specified temperatures, according to the condition of the fruit. Considerable quantities, however, are carried on short voyages in ordinary cargo ships, and, as in the case of other fruit, ventilation is specially needed, with vertical and horizontal air passages. One of the principal trades in which bananas are carried in ordinary vessels is that from the Canary Islands.

It is recommended by shipmasters and surveyors familiar with these trades that the first day out from the loading port the temperature be reduced, if possible, to about 50° F., which can frequently be achieved by the use of windsails. With green bananas there is a danger that the temperature may be reduced too low, and if it is brought below say 46°, then ventilation must be stopped, and only be reintroduced in any particularly warm places, because if the fruit arrives too cold it will not ripen for the market. It is advisable to use a thermometer frequently. The temperature of the compartments should be taken at least every watch, and in the shadow on deck for the deck cargo, and carefully recorded.

It should be remembered that it is not the actual heat that will damage bananas, but the stagnant air, and therefore it is always essential to have a good circulation of air through the cargo. This can always be arranged by using windsails laid right down through the air trunks and deck ventilators, remembering that the current of air underdeck is in a contrary direction to that above deck. Trimming hatches should be kept off and air spaces should be left over the crates. Crates should never be stowed in the square of the hatch; this should always be left clear to allow good ventilation.

GRAIN

Owing to the great importance of the oversea grain trade and to the damageable and destructive character of grain cargoes, there have been published many regulations regarding the stowage and carriage of this commodity. The various grains—wheat, rye, barley, oats, and others—are shipped from Argentina, Canada, Australia, the east, west, and gulf coasts of the United States, India, South Africa (maize), North Africa, and a few other regions of lesser importance.

Grain is a cargo that may be very dangerous to carry. It is likely to shift, give the vessel a heavy list, and possibly cause it to founder, and for this reason the grain-loading regulations published by various bodies and quoted herewith should be strictly adhered to.

Grain is sometimes shipped in a wet or green condition and this makes it very liable to heat, sweat, and deteriorate. Moist grain has been known to swell to such an extent as to seriously strain the carrying

vessel. All grain, whether wet or dry, will settle during the voyage, often to the extent of 5 to 6 percent or more. This means that it will settle 1 foot or more, or to well below the deck beams in the lower holds of a fair-sized ship. Good trimming is required to minimize settling as much as possible, and also necessary is the erection of shifting boards and feeders, as described in the various regulations, to prevent the settled grain from shifting to one side or the other of the vessel and causing a dangerous list (fig. 65). The most important part of stowing a bulk grain cargo is to see that it is well trimmed and that every hold is thoroughly well filled. This should not be left to the trimmers, but should be overseen by the officers and other persons who are concerned with stowage and who have an interest in the safe arrival of the cargo or the safety of the ship.

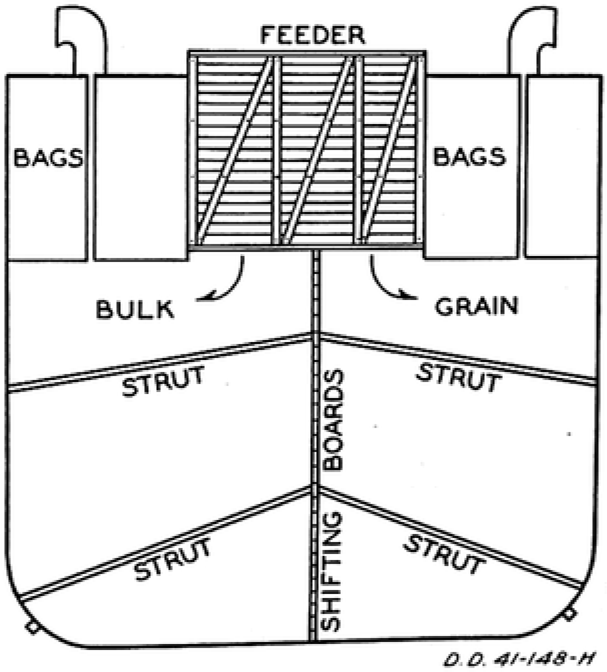

Figure 65.—Carriage of grain in bulk, showing arrangement of fore and aft shifting boards and feeder.

Adequate ventilation is a primary consideration in the carriage of practically all grain cargoes, and should receive continued attention throughout the voyage.

Several different kinds of grain are frequently shipped in the same vessel and it is often necessary to stow two or three kinds in one compartment. This gives rise to danger of the different grains mixing. When different grains are stowed in this fashion they are separated by separation cloths, usually made of burlap. Great care is needed in laying these cloths. They should on no account be laid tight, but sufficient slack should be left to allow for the settling of the cargo. The cloths should be nailed along the shifting boards and tucked well in beneath the cargo battens on the side of the ship. It is also very helpful, if old and empty bags are available, to put one bag in between each frame behind the cargo battens. If these steps are taken, there should be very little mixture.

From some ports—particularly those of India—cargoes frequently consist of various grains and seeds shipped in bulk. This gives rise to the question of which kind of cargo should be stowed under or over the other. Some seeds, such as rape and similar seeds, will penetrate more than others and will find their way down through almost any place and cause mixture, whereas a heavy grain like wheat would not. Rape and similar seeds should therefore usually be stowed on the bottom. Given parcels of rape seed, oats, and wheat to stow in a single compartment, for example, the rape seed should be stowed below, the wheat next, and the light grain, oats, on top. Should a slight mixture then occur, the oats and wheat would be little harmed by being mixed, and the wheat could be separated from the rape seed by means of a sifter.

The stowage of grain in bags requires careful attention. In all cases the ship must be thoroughly clean, the holds dry, the dunnage well laid, and all iron parts thoroughly covered. Ventilation requires constant attention, and in fair weather the hatches should be opened and the cargo examined for signs of heating. The bleeding of bags should never be permitted, since it is very liable to interfere with the ventilation and to stimulate heating of the cargo. Grain in bags occupies 10 to 12 percent more space than grain in bulk.

The weights and measures used in the oversea grain trades are given in the appendix, under the heading "Weights and Measures Used in Shipping."

Stowage factors of grains.—The stowage factors of the various grains can only be stated as close approximations, since the factor will vary somewhat according to the grade of the specific grain, whether it is shipped early or late in the season, and the country of origin. The stowage factors of bagged grain vary also according to type of compartment—large or small, deep or shallow, rectangular or pointed—and according to the number of stanchions or other obstructions in the holds; and whether the bags are well or poorly filled. Factors given in the "Lists of Stowage Factors" are generally accepted and represent fair averages by the use of which the carrying capacity of a vessel or a specific compartment can be estimated within a reasonable margin.

REGULATIONS GOVERNING STOWAGE AND CARRIAGE OF GRAIN

The principal regulations governing the loading, stowage, and carriage of grain are those issued by the Board of Underwriters of New York, rules dated August 28, 1929; the British Merchant Shipping Act, 1894, sections 452–456, also the 18th Schedule; British Merchant Shipping Act, 1906, sections 3 and 11; and the regulations of the Port Warden of Montreal. These are given below, together with the regulations of Australia and New Zealand.

RULES OF THE BOARD OF UNDERWRITERS OF NEW YORK FOR LOADING GRAIN

1. Vessels having freeboards assigned by the Rules of the Board of Trade (Marine Dept.) London, or by any recognized Classification Society, shall not be loaded deeper than permitted by such rules, or assigned freeboard. When no freeboard has been assigned as above then the surveyor supervising the loading of such steamer will assign the draft of water, or freeboard, in accordance with the requirements of the rules of the American Bureau of Shipping.

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2. When grain is carried in bulk shifting boards must extend from the upper deck to the tank-top, or in the case of a single bottom steamer to the keelson, and to the top of all amidship feeders. These shifting boards must be grain-tight, with grain-tight fillings between the beams. Beam fillings are to be of the same thickness and material as the main shifting boards, to be secured by two vertical two inch by eight inch (2" x 8") boards each side, extending to deck-head and two feet (2') below the beams, securely nailed with six-inch (6") nails.

3. Shifting boards referred to in all these rules must be of two inch (2") *sound lumber.*

4. The maximum unsupported span to be allowed for shifting boards of varying thicknesses is as follows: 2-inch planks unsupported span not to exceed 8 feet; 2½-inch planks unsupported span not to exceed 10 feet; 3-inch planks unsupported span not to exceed 12 feet.

All housings at bulkheads to be three inches (3") of solid construction or else shored.

Where 2½-inch or 3-inch shifting boards are used, longitudinal joints may be butt joints between uprights, care being taken to have at least 4 inches of plank supported. When 2-inch shifting boards are used, joints must overlap at least 9 inches.

5. Steamers loading small quantities of grain in any of the lower holds forward of the engine room, not more than one-third of the capacity of a compartment, will not be required to have shifting boards in such holds. Steamers loading small quantities of grain in the lower holds abaft of the engine room, where the tunnel divides such cargo spaces, and where not more than one-half of the capacity of the compartment is filled with grain, will not be required to have shifting boards in such holds.

The bulk grain, however, must have the proper separation and be secured as provided for in sections 6 and 7 of the general rules for steamers loading grain and in addition to the requirements as set forth an additional two tiers of bagged grain or the equivalent in general cargo will be required to secure the bulk grain.

This rule, however, does not apply to a vessel carrying a full cargo of grain in bulk, where the end holds may be partially filled with bulk grain.

6. When wire stays are used in lieu of shores for either permanent or non-permanent fittings, the following minimum sizes will be required:

(a) 3-inch flexible steel wire rope stays, fitted horizontally.

(b) 1¼-inch rigging screws, which preferably should be fitted at the side of the ship for convenience and easy access for tightening.

(c) 1-inch shackles.

(d) 1¼-inch screw bolts through wood or anglebar uprights.

(e) Four ⅞-inch nut and screw bolts, for securing the wood uprights or steel anglebars together.

(f) 1-inch eyeplates, efficiently riveted to side stringers or frames or 1-inch shackle through frame.

7. Where wire stays are used instead of shores or where permanent steel uprights have been approved by the British Board of Trade, or the Canadian Department of Marine, the maximum unsupported span allowed for boards of various thicknesses is as follows:

Thickness	*Span*	*Housing at bulkhead*
2½-inch planks	Unsupported span	12 feet, 3 inches
3-inch planks	Unsupported span	13 feet, 3 inches

8. When grain is carried in bulk, such grain must be supplied by feeders, constructed in accordance with the requirements of this paragraph, or otherwise secured by bag grain or other approved general cargo.

For the purpose of this rule, feeders are to be designated as follows: (a) Main or amidship feeders; (b) wing feeders.

(a) Main or amidship feeders must be built of four inch by six inch (4" x 6") stanchions, of good sound lumber, placed on edge every thirty inches (30"), center to center, if points of support are eight feet (8') or less. If over eight feet (8'), 24" apart, center to center. Boards inside stanchions to be of 2" planks or two layers of 1" planks.

(b) Modern two deck steamers with trimming hatches may have properly constructed wing feeders not to exceed twelve by sixteen feet (12' x 16'). If

full dimension wing feeders are required, such feeders are to be built of the same material and construction as required for main or hatch feeders. If wing feeders of six feet by eight feet (6′ x 8′) are required in a ten foot 'tween deck, two inch by four inch (2″ x 4″) stanchions on edge, twenty inches apart, center to center, are to be used. In an eight foot 'tween deck, such stanchions may be twenty-four (24) inches apart, center to center. All stanchions must be of sound lumber, well braced and secured.

(c) Bunker hatches may be used as feeders when feasible.

(d) All main or amidship feeders must contain at least two and one-half percent (2½%) of the carrying capacity of the hold.

(e) The minimum amount of grain carried in feeders supplying any one compartment must be two and one-half percent (2½%). The maximum amount carried in feeders must not exceed eight percent (8%).

All feeders must be grain tight.

9. Steamers with laid 'tween decks, must have hatchway feeders; and if the distance in the lower holds, between the forward bulkhead and the nearest end of the hatchway feeder exceeds twenty-five feet (25′) (unless in the opinion of the Surveyor the distance should be less) then the vessel must have a wing feeder on each side provided in the 'tween decks to feed this space. If there are no openings in the 'tween decks for wing feeders, four (4) tiers of bags must be put on top of the bulk grain from the bulkhead to within twenty-five feet (25′) of the hatchway feeders.

The same rule applies when the distance between the after end of the hatchway feeder and the after bulkhead in lower holds exceeds twenty-five feet (25′).

10. When steamers load grain in one or more hatches, they may construct feeders with bag flour, oil cake or hard bag freight, but not grain in bags, providing steamers' freight and grain are consigned to the one port. The freight or bags must be locked in a square stowage and a save-all placed round opening to prevent leakage of grain. Deck to have normal amount of freight and the stowage must be approved by the Surveyor.

11. Steamers with two or more decks not having sufficient and properly constructed wing and amidship feeders, will be required to leave sufficient space above the bulk in lower hold, not less than 5 feet under deck beams, to properly secure it with grain in bags or other cargo; the bulk to be covered with boards as in General Rule 6. If an orlop deck has sufficient openings to the lower hold, the orlop and lower hold may be considered as one hold and loaded accordingly.

12. (a) In double deck steamers, no grain or seeds in bulk except oats and/or cotton seed (as hereinafter provided in Rules 17 and 18) is to be carried in the 'tween decks, nor in ships which have more than two decks, between the two upper decks, unless in feeders, properly constructed to feed the orlops and lower holds. An exception, however, will be made in the case of a steamer which has a 'tween-deck compartment over a deep tank, the length of which does not exceed the breadth of the steamer, forward of the stokehold, in which case it will be permitted to load bulk grain in this 'tween-deck compartment, providing the grain is trimmed and fed, or otherwise secured, to the satisfaction of the Surveyor.

(b) Where a steamer has more than three decks, bulk grain may be carried in the deck or decks below the third deck, or in the second deck below the main deck, providing such lower decks have wing openings, and the proper amidship feeders are constructed in the upper decks, but said feeders are to contain not less than two and one-half percent (2½%) of the bulk grain in the lower hold and lower decks. It is however understood that Rule 9 must be complied with when conditions call for same.

13. (a) Steamers that are partly single deck and partly double deck, known as switchback, or as part awning deck steamers, may load all bulk grain in the lower holds of their double deck compartments, providing proper amidship feeders and wing feeders are fitted, and the space in the 'tween decks around the feeders is filled with bagged grain or general cargo. If the vessel is too deep to carry any grain or other cargo in the 'tween decks the feeders are to be shored or properly secured, to the satisfaction of the Surveyor.

(b) If there are no openings in 'tween decks for wing feeders and the bulkheads are more than twenty-five feet (25′) away from the nearest end of the amidship feeders, four (4) tiers of bags must be put on top of the bulk grain from the bulkheads to within twenty-five feet (25′) of the feeders, unless in the opinion of the Surveyor the distance should be less.

14. Single deck steamers with high hatch coamings loading full or part cargoes of grain.

(a) Hatch coamings may be used as feeders and must be of sufficient size, measuring from the top of the coamings to the deck, to admit of not less than two percent (2%) of the total grain in the hold being stowed within the coaming; otherwise, the bulk grain must be secured by four (4) tiers of bags.

(b) When hatch coamings are utilized for feeders and such coamings extend into the hold a foot or more below the main deck, such coamings, in the part below the deck, are required to have two (2) 2-inch openings in the coamings, between the beams, to allow the grain to feed into the wings and ends of the hold.

(c) The hatch coamings must be properly supported by heavy iron cross beams and fitted with fore and aft shifting boards.

(d) The hatch coamings must be so placed that they are capable of feeding the center and both ends of the holds.

(e) Where a steamer has two or more decks and these rules permit her to carry grain in bulk below the second and/or lower decks, she shall, if the coamings extend more than 1 foot into the hold or deck spaces, have two (2) 2-inch openings in the coamings between each beam, and one (1) two-inch opening every 2 feet on the ends to allow the grain to feed into the wings and ends of the compartment carrying grain.

15. In single deck steamers oats and/or cotton seed may be loaded over heavy grain provided same are properly separated and any loose grain secured.

16. Single deck steamers with a long bridge deck, or bridge and forecastle combined, may carry grain in properly constructed feeders in the square of the hatches in said deck to feed the bulk grain in the holds below, provided that all outboard ports or other openings, if any, can be properly closed and made watertight.

17. (a) Part cargo of oats and/or cotton seed may be carried in bulk between the two upper decks. If the steamer has four or more hatch compartments, each compartment is to be fitted with grain tight amidship fore and aft shifting boards extending over hatches, deck to deck, and the two or three largest compartments must be fitted with wing shifting boards, port and starboard, extending from bulkheads at each end of compartments to within four (4) feet of hatch. The main compartments, whether two or three (2 or 3) compartments, must have sixty percent (60%) of the total capacity of the 'tween decks, taken as a whole, when oats or cotton seed is carried in bulk. The hatch and wing feeders for the lower hold or orlop must be capped boxed feeders five or six (5 or 6) feet in depth when grain other than oats or cotton seed is carried below.

(b) If the steamers 'tween decks are not divided by bulkheads in compartments then bulkheads are to be built to divide such 'tween decks into compartments of a maximum length not exceeding seventy (70) feet. Each compartment is to have grain tight amidship shifting boards, deck to deck, and the same rule will apply as in the case of the steamer with four or more hatch compartments.

(c) A steamer with two (2) or more decks may load bulk grain in lower holds and oats and/or cottonseed on top with proper separation. All the 'tween decks are to be fitted with amidship shifting boards, fore and aft, and over hatches, and two wing shifting boards, port and starboard, from each bulkhead to within four (4) feet of hatches, in all compartments. All wing hatches and main hatches to be left open in decks, to feed oats and/or cotton seed below. If no wing hatches then Rule 9 will apply.

(d) Oats can be stowed in 'tween decks over general cargo in lower holds, providing the 'tween decks are fitted in accordance with the foregoing requirements.

18. Steamers with double bottom tanks for water ballast, or having divided double-bottom tanks for fuel oil, may carry a full cargo of oats and/or cotton seed (except as provided for in General Rule 8). Lower holds are to be fitted in accordance with regulations for grain carrying, and if with two or more decks, each deck is to be fitted with amidship grain tight shifting boards fore and aft, and over hatches, and two (2) wing shifting boards from each bulkhead to within four (4) feet of hatches. All hatch and wing feeders are to be left open. All beams and fore and afters are to be in position.

General Rules for Steamer Loading Grain

1. Steamers carrying full cargoes of grain, sailing between the 1st of October and the 1st of April, shall not be permitted to carry coal on deck beyond such a supply as will be consumed prior to the vessels' reaching the ocean.

2. When coal is permitted to be carried on deck, the hatches and trimming hatches must be securely fastened before the coal is loaded on the decks.

3. Stoke hold bulkheads and donkey boiler recesses are required to be sheathed with wood and made grain tight, with an air space between the iron and the wood, when exposed to heat from fireroom or donkey boiler. When already properly sheathed Surveyor may pass the vessel, but not less than nine inches (9″) of space will be required where the sheathing is to be erected or renewed. This rule applies where the fires are liable to cause damage by excessive heat from the stokehold or donkey boiler.

4. (a) Steamers having water ballast tanks must have them covered with a grain-tight platform made of two and one half inches (2½″) or three inches (3″) sound planks, but this platform may be dispensed with where the tops of the tanks are of heavy plates.

(b) Steamers without ballast tanks, having a platform in good order, will not be required to have a grain floor over it, but otherwise such grain floor will be required.

5. Steamers loading small quantities of grain in lower hold, not more than one-third of the capacity of a compartment, will not be required to have shifting boards. The grain, however, must have the proper separation as provided for in these rules and be secured with cotton or other suitable cargo.

6. Care must be taken when grain in bags or general cargo is stowed over bulk grain, that the bulk grain is covered with two thicknesses of boards, placed fore and aft and athwartships, with spaces between the lower boards of not more than four feet (4′) and the upper boards of not more than four inches (4″). Care must also be taken that all of the bags are well filled, in good order, and properly stowed, and that the tiers are laid close together.

7. Steamers having one deck and beams may carry bulk grain to such a height as will permit the stowage over it of not less than four (4) tiers of bags of grain or other suitable cargo. All bags or other cargo to be stowed on two (2) tiers of boards as provided for in our rules.

8. Grain, oats, and/or cottonseed in poop, peaks, or bridge deck, must have such grain in bags and have proper dunnage and shifting boards.

9. Single or double-deck steamers having a continuous hold, forward and/or aft, carrying heavy grain, will be required to have a closed bulkhead to divide the hold or holds.

10. When a vessel loads a full cargo of grain, if bulk grain is loaded in a deep tank which is divided by a center line bulkhead, such bulk grain must be supplied with a feeder of sufficient size to feed the grain in the deep tank.

11. All bulk grain or oats must be well trimmed up between the beams and in the wings, and the space between them completely filled.

12. Single deck steamers loading full cargoes of grain in bags will be required to have shifting boards extending not less than four (4) feet downward from the deck into the holds.

Steamers with 'tween decks loading full cargoes of grain in bags must have shifting boards fitted to extend not less than four (4) feet downward from the beams in the lower holds and from deck to deck in the 'tween decks.

To prevent bags' coming in contact with iron, all ironwork must be covered with paper or other suitable covering.

When loading full cargoes of grain in bags, the bags must be of good quality, well sewed, carefully handled, and when filled on board extra precautions taken against spillage, all to the satisfaction of the Surveyor.

13. In a cargo of bulk grain where a portion of the grain in the 'tween decks is bagged to comply with loading regulations only, and which will ultimately be discharged in bulk, dunnage and vertical battens on hold sparrings can be dispensed with. This does not affect in any way the requirements for loading cargoes or consignments of bagged grain, which must be dunnaged.

Security of Hatches

Surveyors shall pay special attention to the security of hatchways and other weather deck openings; they should satisfy themselves that the hatch covers and

their supports are in good condition and that the steamer is provided with good and sufficient tarpaulins, cleats and wedges to enable the hatches to be properly battened down.

Additional security should be provided by the use of:

(a) Folding wedges, also known as double or fox wedges, or cleats set at an angle with ordinary wedges.

(b) Locking bars in suitable number and position to secure the hatch coverings, or

(c) Wire cross lashings set up by screws or other equally effective means. At all times lashings are to be set up to ring bolts or permanent cleats, at the side of the hatches with suitable chafing pieces to prevent cutting of tarpaulins.

Steamers With Part Cargoes of Grain Desiring to Shift to Another Port to Load Grain or General Cargo

Steamers may load any hold with less than 50% of its bulk grain capacity without securing the grain, provided shifting boards extend above the grain in each hold at least three feet.

Steamers may load more than 50% of grain capacity in one hold and less than 50% in one other hold only, without securing the grain, providing shifting boards extend above the grain in each hold at least three feet.

In all cases before leaving her first port the steamer's bulk grain must be covered with dunnage boards placed fore and aft and athwartship.

This rule applies to steamers shifting between Newport News and Portland, Maine.

In the Gulf Ports this rule applies to steamers shifting from a port in the Gulf to another Gulf Port during all months, except July, August, September, and October.

Stowage of Paper in Rolls Over Grain

The Board's attention has been called to the fact that paper in rolls has been stowed over grain and used for the purpose of securing grain cargoes.

It is the Board's opinion that this stowage should not be allowed as the grain is liable to sweat and permeate the rolls of paper.

BRITISH REGULATIONS GOVERNING CARRIAGE OF GRAIN

The law relating to the carriage of grain in ships is contained in sections 452 to 456 of the Merchant Shipping Act, 1894, and sections 3 and 11 of the Merchant Shipping Act, 1906.

The principal features are contained in the following sections:

Section 452 (1).—Where a grain cargo is laden on board any British ship, all necessary and reasonable precautions * * * shall be taken in order to precent the grain cargo from shifting.

NOTE.—In a notice issued by the Board of Trade (August 1913), it was pointed out that the Board "are not prepared to advise in general terms as to what precautions shall be taken in the case of vessels loading grain at foreign ports other than Mediterranean, Black Sea, or North American Ports." Owners and masters are, however, thereby warned that the responsibility for taking all "necessary precautions," prescribed by Section 452 as above, is placed upon them by law.

Section 453 (1) applies to British ships "laden with grain cargo at any port in the Mediterranean or Black Sea" and "bound outside the Straits of Gibraltar" on which vessels it is compulsory for the precautions set out in the Eighteenth Schedule of the 1894 Act (see further) to be taken. It also applies to a vessel loading grain in North American ports unless she is loaded in accordance with local Regulations approved by the Board of Trade. Section 3 (1, 2, and 3) apply, to a limited extent, the provisions of the M.S.A., 1894, to foreign ships loading or arriving with grain in the United Kingdom.

MERCHANT SHIPPING ACT, 1894

(Sections 452 to 456 Carriage of Grain)

452. (1) Where a grain cargo is laden on board any British ship all necessary and reasonable precautions (whether mentioned in this part of this Act or not) shall be taken in order to prevent the grain cargo from shifting.

(2) If those precautions have not been taken in the case of any British ship, the master of the ship and any agent of the owner who was charged with the loading of the ship or the sending of her to sea, shall each be liable to a fine not exceeding three hundred pounds, and the owner of the ship shall also be liable to the same fine, unless he shows that he took all reasonable means to enforce the observance of this section, and was not privy to the breach thereof.

453. (1) Where a British ship laden with a grain cargo at any port in the Mediterranean or Black Sea is bound to ports outside the Straits of Gibraltar, or where a British ship is laden with a grain cargo on the coast of North America, the precautions to prevent the grain cargo from shifting, set out in the Eighteenth Schedule to this Act, shall be adopted, unless the ship is loaded in accordance with regulations for the time being approved by the Board of Trade, or is constructed and loaded in accordance with any plan approved by the Board of Trade.

(2) If this section is not complied with in the case of any ship, reasonable precautions to prevent the grain cargo of that ship from shifting shall be deemed not to have been taken, and the owner and master of the ship and any agent charged with loading her or sending her to sea shall be liable accordingly to a fine under this part of this Act.

(3) Nothing in this section shall exempt a person from any liability, civil or criminal, to which he would otherwise be subject for failing to adopt any reasonable precautions which, although not mentioned in this section, are reasonably required to prevent grain cargo from shifting.

454. (1) Before a British ship laden with grain cargo at any port in the Mediterranean or Black Sea and bound to ports outside the Straits of Gibraltar, or laden with grain cargo on the coast of North America, leaves her final port of loading, or within forty-eight hours after leaving that port, the master shall deliver, or cause to be delivered to the British consular officer, or, if the port is in a British possession, to the chief officer of Customs, at that port, a notice stating—

(a) The draught of water and clear side, as defined by this part of this Act, of the said ship after the loading of her cargo has been completed at the said final port of loading; and

(b) The following particulars in respect to the grain cargo; namely,

(i) The kind of grain and the quantity thereof, which quantity may be stated in cubic feet, or in quarters, or bushels, or in tons weight; and

(ii) The mode in which the grain cargo is stowed; and

(iii) The precautions taken against shifting.

(2) The master shall also deliver a similar notice to the proper officer of Customs in the United Kingdom, together with the report required to be made by the Customs Consolidation Act, 1876, on the arrival of the ship in the United Kingdom.

(3) Every such notice shall be sent to the Board of Trade, as soon as practicable, by the officer receiving the same.

(4) If the master fails to deliver any notice required by this section, or if in any such notice he wilfully makes a false statement or wilfully omits a material particular, he shall for each offence be liable to a fine not exceeding one hundred pounds.

(5) The Board of Trade may, by notice published in the London Gazette, or in such other way as the Board think expedient, exempt ships laden at any particular port or any class of those ships from this section.

455. For securing the observance of the provisions of this part of this Act with respect to grain cargo, any officer having authority in that behalf from the Board of Trade, either general or special, shall have power to inspect any grain cargo and the mode in which the same is stowed, and for that purpose shall have all the powers of a Board of Trade inspector under this Act.

456. For the purpose of the provisions of this part of this Act with respect to grain cargo—

The expression "grain" means any corn, rice, paddy, pulse, seeds, nuts, or nut kernels.

The expression "ship laden with a grain cargo" means a ship carrying a cargo of which the portion consisting of grain is more than one-third of the registered tonnage of the ship, and that third shall be computed, where the grain is reckoned in measures of capacity, at the rate of one hundred cubic feet for each ton of registered tonnage, and where the grain is reckoned in measures of weight, at the rate of two tons' weight for each ton of registered tonnage.

Merchant Shipping Act, 1894

(*Eighteenth Schedule—Precautions as to Grain Cargo*)

(1) There shall not be carried between the decks, or, if the ship has more than two decks, between the main and upper decks, any grain in bulk, except such as may be necessary for feeding the cargo in the hold, and is carried in properly constructed feeders.

(2) Where grain (except such as may be carried in properly constructed feeders) is carried in bulk in any hold or compartment, and proper provision for filling up the same by feeders is not made, not less than one-fourth of the grain carried in the hold or compartment (as the case may be) shall be in bags supported on suitable platforms laid upon the grain in bulk. Provided that this regulation with respect to bags shall not apply—

(a) To oats, or cotton seed; nor

(b) To a ship which is a sailing ship of less than four hundred tons registered tonnage, and is not engaged in the Atlantic trade; nor

(c) To a ship laden at a port in the Mediterranean or Black Sea if the ship is divided into compartments which are formed by substantial transverse partitions and are fitted with longitudinal bulkheads or such shifting boards as hereinafter mentioned and if the ship does not carry more than one-fourth of the grain cargo, and not more than one thousand five hundred quarters in any one compartment, bin or division, and provided that each division of the lower hold is fitted with properly constructed feeders from the between decks; nor

(d) To a ship in which the grain cargo does not exceed one-half of the whole cargo of the ship, and the rest of the cargo consists of cotton, wool, flax, barrels or sacks of flour, or other suitable cargo so stowed as to prevent the grain in any compartment, bin, or division from shifting.

(3) Where grain is carried in the hold or between the decks, whether in bags or bulk, the hold or the space between the decks shall be divided by a longitudinal bulkhead or by sufficient shifting boards which extend from deck to deck or from the deck to the keelson and are properly secured, and if the grain is in bulk are fitted grain-tight with proper fillings between the beams.

(4) In loading the grain shall be properly stowed, trimmed, and secured.

Merchant Shipping Act, 1906

(*Sections 3 and 11*)

Section 3.—(1) After the first day of October one thousand nine hundred and seven, sections four hundred and fifty-two and four hundred and fifty-five of the principal Act shall apply to a foreign ship which loads a grain cargo in the United Kingdom so long as the ship is within a port in the United Kingdom.

(2) If, after the first day of October one thousand nine hundred and seven, a foreign ship laden with grain cargo arrives at any port in the United Kingdom, having the grain cargo so loaded that the master of the ship, if the ship were a British ship, would be liable to a penalty under the provisions of Part V of the principal Act relating to the carriage of grain, the master of that foreign ship shall be liable to a fine not exceeding three hundred pounds.

(3) After the first day of October one thousand nine hundred and seven, section four hundred and fifty-five of the principal Act, shall apply to a foreign ship laden with grain which discharges all or any part of her cargo at any port in the United Kingdom, so long as the ship is within a port in the United Kingdom.

(4) The provisions of section four hundred and fifty-four of the principal Act, so far as that section provides for the delivery of the notice mentioned therein to the proper officer of Customs in the United Kingdom, shall apply to all foreign ships laden with grain arriving at a port in the United Kingdom after the date aforesaid, and the master of the ship shall be liable accordingly.

Section 11.—Any offence for which a person is liable to a fine under sub-section (2) of section four hundred and fifty-two of the principal Act (which relates to the obligation to take precautions to prevent grain cargo from shifting) or under any provision of this Act, which relates to the lading of grain cargoes or foreign ships, may be prosecuted summarily; but the fine to which a person is liable for any such offence shall not, if the offence is prosecuted summarily, exceed a hundred pounds.

REGULATIONS OF THE PORT WARDEN OF MONTREAL FOR THE LOADING AND CARRIAGE OF GRAIN CARGOES

(a) In these Rules and Regulations a reference to "light grain" means oats and/or cotton seed. All other grain is "heavy grain."

(b) The provisions of sections A, B, C, D, E, F, and H, apply to heavy grain cargoes, and with the modifications set out in Section G, apply to light grain cargoes, and to combined cargoes of light grain and heavy grain.

A. Preliminary Inspection of Bilges, Etc.

1. The master of any vessel intending to load grain for any port not within the limits of inland navigation shall notify the Port Warden and make arrangements for a preliminary survey.
2. If the vessel has a plan showing the proposals for erection of shifting boards, feeders, etc., which has been approved by the Department of Marine, Ottawa, such plan must be submitted to the Port Warden for his information prior to his preliminary survey.
3. At the preliminary survey, sections of the limber-boards must be clear for inspection of the bilges, which must be clean and clear of any refuse liable to choke the suction pipes.
4. All pipes, gearing, rods, and sounding tubes entering the bilges must be absolutely grain tight. Drain pipes and scupper pipes from compartments carrying bulk wheat must be blocked up.
5. Limber-boards must be graintight, satisfactory to the Port Warden.
6. Cement capping or chocks must be in good condition.
7. Permanent ceiling on tank tops must be made graintight and when laid on top of fuel oil tanks must have a clear space of 2½ inches between ceiling and tank top and be laid on athwartship bearers.
8. The Port Warden, if requested, shall issue within 24 hours of the completion of such preliminary survey a written report setting out the repairs and work necessary to render the vessel fit to carry her proposed grain cargo and any modifications considered necessary for the erection of shifting boards, feeders, etc.
9. The report shall also specify the dunnage required to be laid.

B. Shifting Boards, Upright and Shores

1. Longitudinal graintight shifting boards must be fitted from deck to deck or deck to ceiling in any compartment or hold in which bulk grain is carried and must be continuous for the whole length of the compartment or hold, excepting where vessels load parcels of bulk grain in the lower holds not exceeding one-third the capacity of their respective holds and provided the bulk grain is levelled and covered with platforms in accordance with paragraph 5, section F, and secured with approved cargo to prevent grain from shifting.
2. Shifting boards are to be fitted in the hatchways and trunk feeders up to the bottom of the hatch covers.
3. Shifting boards of a minimum thickness of 2 inches of good sound lumber will be accepted.
4. The maximum unsupported span to be allowed for shifting boards of varying thickness is as follows (not to apply to permanent fittings):

Thickness	*Span*	*Housing at bulkhead*
2-inch planks	Unsupported span	Not to exceed 8 feet 3 inches.
2½-inch planks	Unsupported span	Not to exceed 10 feet 3 inches.
3-inch planks	Unsupported span	Not to exceed 12 feet 3 inches.

5. When shifting boards have a greater unsupported span than the above, they must be supported by wood uprights or other approved means spaced with their centers at distances not greater than provided for by these figures.
6. Wood uprights must not be less than 10 inches in width and 2 inches in thickness.
7. Shifting boards must be securely housed at bulkheads, and where permament angle bar stiffeners are not available for this purpose wood uprights must be fitted not less than 6 inches in width and 3 inches in thickness shored to requirements.

8. Where 2½-inch or 3-inch shifting boards are used, longitudinal joints may be butt joints between uprights, care being taken to have at least 4 inches of plank supported. Where 2-inch shifting boards are used, joints must overlap by at least 18 inches between uprights.

9. Wood uprights must be supported by steel wire rope stays set up at the ship's side, or else by wood shores securely heeled against the permanent structure of the ship, such as frames or stringers at the ship's side, hatch coamings, girders, pillars, etc.

10. In all ships over 50 feet in breadth it is strongly recommended that instead of wood shores, steel wire rope stays be fitted for supporting the shifting boards.

All wood shores must be good sound timber in a single piece.

11. The sizes of the shores required is based on the area of the boards to be supported, thus:

The length of shores may in ordinary cases be taken as equal to half the registered breadth of the vessel less one foot.

S=spacing of shores fore and aft.
D=registered depth (reduced aft by the height of tunnel above floors).
N=number of shores in depth.

$$\text{Area per shore}=\frac{S\times D}{N+1}$$

12. Convenient standard sizes of rectangular shores as follows may be taken as the minimum permissible sizes:

Length of shore:	*Minimum size*
Up to and not exceeding 16 feet	6″ x 4″
Over 16 feet and not exceeding 20 feet	6″ x 6″
Over 20 feet	8″ x 6″

Shores 24 feet and over must be abridged and no shores to be spliced.

13. Where difficulties and delays might be experienced in procuring scantlings as above, shores of lesser scantlings may be sanctioned, provided the area supported is reduced in proportion as may be prescribed by the Port Warden. Where vessels are already fitted with shores of lesser scantlings than prescribed by the above, the Port Warden may sanction the continued use of these provided the timber is in good condition and the area supported is reduced as may be prescribed by the Port Warden.

14. Vertical spacing of shores. The uppermost shore is to be within 18 inches of the top of uprights approximately in a line with the lower edge of hatch coamings and heeled against hatch coamings or girder; every succeeding shore is to be spaced 7 feet apart vertically measured from the uppermost shore down, except that 8 feet may be accepted between the lowest shore and heel support.

Shores may be heeled on the permanent floors or ceilings provided that cleats or cants are used of sufficient dimensions to distribute the strain over several planks.

15. The angle between any shore and the surface to be supported must not exceed 45° from the horizontal.

16. When a shore is set at an angle exceeding 10 degrees from the horizontal the next larger size of shore to that required by its length must be used.

17. Uprights should be cleated to the floor or ceiling where fitted, and when the upright is not securely housed at the top the upper supporting shore should not be more than 18 inches down from the deck or top of the upright.

18. Where either the hold or 'tween decks are fitted with tiers of closely spaced pillars these may be utilized for supporting the shifting boards, provided that they are of the approved size of deck beam pillars.

19. When the pillars are not reeled or staggered to support both sides of the shifting boards, additional support must be given by hook or U clamps spaced 6 feet apart.

20. When wire stays are used in lieu of shores for either permanent or non-permanent fittings, the following minimum sizes will be required:

(a) 3-inch flexible steel wire rope stays, fitted horizontally.
(b) 1¼-inch rigging screws, which preferably should be fitted at the side of the ship for convenience and easy access for tightening.
(c) 1-inch shackles.
(d) 1¼-inch screw bolts through wood or angle-bar uprights.

(e) Four ⅞-inch nut and screw bolts, for securing the wood uprights or steel angle bars together.

(f) 1-inch eyeplates, efficiently riveted to side stringers or frames or 1-inch shackle through frame.

21. Where no special arrangements are made for grain tight filling between the beams, wood filling pieces the same thickness as the shifting boards must be fitted grain tight between the beams, and must be secured in place by cleats or scabs at both ends and fitted both sides. The cleats or scabs are to be at least 2 inches by 4 inches and must extend the full depth of the filling piece and as much again below, and be securely nailed or spiked to the shifting boards and filling pieces.

22. Where permanent steel uprights and wire stays are fitted which have been approved by the Canadian Department of Marine, the Board of Underwriters of New York or by the British Board of Trade, the maximum unsupported span allowed for boards of various thicknesses is as follows:

Thickness	*Span*	*Housing at bulkhead*
2½-inch planks	Unsupported span	12 feet, 3 inches
3-inch planks	Unsupported span	13 feet, 3 inches

23. Where steel uprights are secured as approved at both head and heel, two wire stays on each side of each upright will be accepted in vessels having depth of holds up to and including 30 feet. The uppermost stay is to be placed one-quarter the depth of hold down from the deck, and the lower stay at half depth of hold or in after-holds at half depth measured to tunnel top.

24. The following dimensions are recommended for angle-bar uprights: Each upright to consist of four angle bars 4 inches by 4 inches by .40 and steel plate 11½ inches by .50 riveted to form one complete structure allowing 4-inch housings on both forward and aft sides; equivalent brackets riveted to head and heel of uprights, each to take five ⅞-inch bolts with corresponding lugs and/or angles on tank top, tunnel top, and hatch webs.

C. CONSTRUCTION OF FEEDERS AND WOOD BULKHEADS

1. The walls of trunk feeders and wood bulkheads must be of sufficient strength to withstand the pressure due to the head of grain contained, and must be made grain tight.

2. Trunk feeders in the 'tween decks constructed in the hatchways must be made grain tight around the hatch coamings and hatch beams.

3. Ships having one or more decks with one continuous hold forward and/or one continuous hold aft with two hatches to each hold, shall have a well constructed bulkhead extending from side to side of the ship between the two hatches to divide the space.

4. Thwartship bulkheads in holds for partitioning holds or reserve bunkers shall be constructed of planks not less than 3 inches in thickness, efficiently stiffened and shored.

5. Trunk feeders in the 'tween decks fitted in the hatchways may be constructed of planks worked vertically of a minimum thickness of 2 inches. When the vertical unsupported span exceeds 8 feet, thicker planks must be used, or increased stiffening must be fitted as the Port Warden may require.

6. Where more convenient, feeders may be constructed of studding and lined with grain tight boards 2 inches in thickness or two 1-inch layers of shiplap, laid horizontally with broken joints. Studding where possible should be placed inside the hatch coamings and must not be less than 4 inches by 6 inches on edge spaced not more than 2 feet centers.

Wing feeders are to be constructed in a similar manner. Feeders already erected may be accepted if such feeders are equal from a structural standpoint to specifications as outlined.

7. Engine room and stokehold bulkheads and donkey recesses where subjected to heat must be sheathed with wood and made grain tight. An air space of at least 6 inches should be left between the bulkhead and the sheathing and a box trunk ventilator 6 inches by 8 inches should be provided from the top of the air space to a ventilator or hatchway, or other equal and approved means of ventilation adopted.

8. Sheathing should be supported on vertical wood runners spaced not less than 2-feet centers and should consist of 2-inch planks or two thicknesses of 1-inch boards laid to break joint

D. LOADING REGULATIONS

In these regulations "steamship" includes any vessel propelled wholly or in part by steam or by any machinery or power other than sails or oars.

Single Deck Steamships

1. Single deck steamships with high hatch coamings may load full cargoes of grain in bulk below deck. The hatch coamings may be used as feeders provided they contain not less than 2 percent of the capacity of the hold they are designed to feed and are so placed that they are capable of feeding the center and both ends of such hold.
2. Where no provision is made for feeding the hold, the bulk grain must be secured by four heights of bagged grain laid on a suitable platform on top of the grain in bulk.
3. Grain in bags may be carried above deck in deck erections when complying with regulations re shifting boards and dunnage.

Two-deck Steamships

1. Two-deck steamships may carry bulk grain to the full capacity of all lower holds, provided properly constructed feeders are fitted in the hatches and trunked in the 'tween decks, and, if necessary, with supplementary feeders as required by paragraph 4, "Stowage." Such feeders shall contain not less than 2½ percent and not more than 8 percent of the capacity of the hold they are designed to feed and be so placed that they are capable of feeding the center and both ends of such hold.
2. All other grain in the 'tween decks and/or deck erections must be in bags, complying with regulations affecting shifting boards and dunnage.

Two-deck Steamships With Bridge Deck or Bridge and Poop Combined

3. Two-deck steamships having a bridge deck or bridge and poop combined, constituting in each case a third deck over a partial length of vessel, may carry bulk grain in the lower 'tween decks in that part of vessel where there are three decks, providing properly constructed feeders are erected between the uppermost and second decks to efficiently feed the bulk grain in the respective 'tween decks and lower holds—as in the case of three-deck steamships.

Three-deck Steamships

1. Three-deck steamships may carry grain to the full capacity of all lower holds and lower 'tween decks provided properly constructed midship feeders are fitted trunked in the upper 'tween decks, and the third deck down is fitted with proper trimming hatches suitably placed to feed the wing spaces and ends of the holds. If the third deck down is fitted with proper trimming hatches the lower hold and the lower 'tween decks may be considered as one hold and loaded accordingly. All hatches and trimming hatch covers on the third deck down are to be left off. The feeders shall contain not less than 2½ percent and not more than 8 percent of the combined capacity of the lower holds and 'tween decks which they are designed to feed.
2. Lower holds and lower 'tween decks when loaded to capacity may be loaded as separate compartments provided that properly constructed feeders are erected in both upper and lower 'tween decks to efficiently feed the bulk grain in both the lower holds and lower 'tween decks independently. The feeders shall contain not less than 2½ percent and not more than 8 percent of the compartments they are designed to feed.
3. All other grain in the upper 'tween decks and/or erections must be in bags and have shifting boards fitted.
4. Deep tanks.—Vessels loading part cargoes of bulk grain not exceeding two-thirds of the total cargo-carrying capacity of such vessel will not be required to have a feeder for the deep tank, provided the deep tank is divided by a steel center longitudinal bulkhead and that the bulk grain is well stowed, the tank completely filled and hatch covers secured. Feeders will be required over deep tanks for vessels loading in excess of this quantity.

E. Freeboard

1. The freeboard of all ships laden with grain shall not be less than that assigned under the laws of the country in which they are registered.

2. In the case of ships laden with grain not having a freeboard certificate, the Master, on arrival, shall make application to a representative of any recognized classification authority for a freeboard certificate and shall produce such certificate to the Port Warden before clearance will be granted.

F. Stowage

1. In loading, the grain shall be properly stowed, trimmed and secured.

2. Feeders must be suitably arranged as far as possible to feed the different parts of the holds or compartments and when this can be done in ships of ordinary proportions minimum capacity of feeders in 'tween-deck vessels is not to be less than 2½ percent and not more than 8 percent of the capacity of the holds which they are designed to feed, and in the case of single deck vessels the minimum capacity of the deep hatch coamings is not to be less than 2 percent capacity of the holds.

3. Capacity of feeders is to be the net internal capacity after allowing for shifting boards, shores, or hatch beams measured above the line of the deck to the top of the feeder.

If the depth of the hatch end beams or coamings exceeds 15 inches, special means must be adopted to allow the grain to pass from the feeders to the holds. When the depth is 16 inches, 2 inches in diameter, and when 18 inches, 3½ inches in diameter feeding holes are sufficient when spaced not more than 2 feet apart.

4. In ships fitted with 'tween decks, should the distance in the lower holds between the forward and after bulkheads in such hold and the nearest end of the hatchway feeder exceed 25 feet (unless in the opinion of the Port Warden the distance should be less) the vessel must have a supplementary feeder provided on each side of the 'tween decks forward and aft to feed the space in the hold below; the size of the supplementary feeder to be prescribed by the Port Warden. Provided that if supplementary feeders to the lower holds are not fitted the grain in the end spaces shall be leveled off and a proper platform provided and 4 tiers of bagged grain stowed on the platform to within 25 feet of the end of the main feeder. This rule shall apply to the lower 'tween decks in the case of 3-deck vessels when the compartment and the hold are loaded as one compartment.

5. When bulk grain does not completely fill the compartment in which it is carried and is secured by bagged grain or other suitable cargo laid on top of the grain in bulk, such bagged grain or other cargo shall be supported on platforms laid in bulk grain and so stowed as to prevent the grain from shifting.

6. Platforms to consist of thwartship bearers spaced not more than 4 feet apart and 1-inch boards laid fore and aft spaced not more than 4 inches apart.

7. Vessels carrying parcels of grain in bulk in the lower holds forward of the engine room, exceeding one-third of the carrying capacity of such holds, must have shifting boards to the top of the grain. Vessels carrying parcels of grain in bulk in the lower holds abaft of the engine room, and divided by the tunnel, exceeding one-half of the carrying capacity of such holds, must have shifting boards to the top of the grain. In both cases the bulk grain must be covered with platforms as afore described, before any other cargo is stowed over it. When a partially loaded vessel does not carry other cargo to secure the bulk grain, shifting boards must be fitted and the grain be leveled off and covered with a suitable platform upon which shall be stowed not less than four tiers of bagged grain.

8. Partially loaded vessels proceeding to Quebec to pick up additional cargo to be laid on the bulk grain may proceed to such port without securing the bulk grain.

9. Bagged grain stowed in the lower holds shall be secured by longitudinal shifting boards to extend from the beams at least 4 feet down from the lower edge of beams; such shifting boards to be laid with not more than 4 inches between their edges and to be supported by uprights and shores spaced the same distances as laid down for bulk grain.

10. Shifting boards securing bagged grain in 'tween-deck compartments and deck erections to extend from deck to underside of beams, edges to be not more than 4 inches apart and supported in the manner laid down for bulk grain.

11. Bagged grain cargo stowed on iron or on steel decks is to be properly dunnaged.

12. Where cargo battens are not fitted, bagged grain cargo must be properly dunnaged from the ship's side.

13. When grain cloths of approved quality are laid over the ceilings covering water ballast tanks to the approval of the Port Warden the caulking of the seams of the ceilings or the coverings of the seams with battens may be dispensed with.

14. In the case of vessels of modern construction with specially heavy ballast tank top plating in good condition without wooden ceiling, certificates may be granted to load bulk grain, provided the bilges and water courses in the wings are sufficiently deep and that proper precautions are taken against overflow from the bilges and leakage from manhole covers, air and sounding pipes, etc.

15. Paragraphs 11 and 12 do not apply to vessels loading cargoes of bulk grain, when the grain in 'tween decks is bagged to comply with loading regulations only and which will ultimately be discharged in bulk; in which cases dunnage and vertical battens over 'tween deck sparing may be dispensed with. This not to affect in any way the requirements for protecting cargoes or consignments of bagged grain.

16. Heavy cargo, except coal, may be stowed on the wood ceiling, provided approved separation cloths be laid on top of the said cargo prior to taking of grain, but only such quantities of heavy cargo to be permitted as will in no way interfere with the stability of the vessel.

17. In the event of unusual construction of vessels which may necessitate deviation from the foregoing rules the Port Warden may use his discretion, subject to the approval of the examiners of the office of Port Warden.

G. LIGHT GRAIN

1. Light grain may be carried in bulk in all between decks and lower holds subject to the requirements laid down in Sections A, B, C, D, E, and F.

2. Feeders. (a) For single deck steamship, Section D, loading regulations will apply.

(b) For steamships having two decks, grain-tight feeders in accordance with Section C (loading regulations) are to be erected in hatches and trunked in 'tween decks to feed the lower holds and to contain not less than 2½ percent and not more than 8 percent of the capacity of the holds they are designed to feed.

These trunk feeders must not interfere with or decrease the 2 percent which is required to be carried within the hatch coamings to feed the 'tween decks.

(c) For steamships having three decks, regulations as outlined for feeders in two-deck vessels will apply; to be erected in the upper 'tween decks to feed the lower 'tween decks and lower holds, hatches and trimming hatches in lower 'tween decks to be left off.

3. Light grain may be loaded in bulk in 'tween decks over heavy grain in lower holds, provided that the above regulations are observed and that proper separation is made.

4. In steamships where 'tween decks and/or shelter decks are not subdivided bulkheads are to be constructed as per section C, paragraph 4, to divide such shelter or 'tween decks into compartments of a maximum length of not exceeding 70 feet.

5. All grain in poop, peaks, or bridge space must be in bags; regulations for shifting boards and dunnage must be complied with.

H. SAFETY

Hatch webs and fore and afters to be secured in place.

Coal on Deck

No coal shall be carried on deck of steamers sailing between the 1st of October and the 1st of April, beyond such a supply as will be consumed prior to vessels reaching the open sea.

Security of Hatches

The Port Warden shall pay special attention to the security of hatchways and other weather-deck openings; he shall satisfy himself that the hatch covers and their supports are in good condition and that the steamer is provided with good and sufficient tarpaulins, cleats, and wedges to enable the hatches to be properly battened down.

For winter passage, North Atlantic, additional security should be provided by the use of:

(a) Folding wedges, also known as double or fox wedges, or cleats set at an angle with ordinary wedges.

(b) Locking bars in suitable number and position to secure the hatch coverings, or

(c) Wire cross lashings set up by screws or other equally effective means. At all times lashings are to be set up to ring bolts or permanent cleats at the side of the hatches with suitable chafing pieces to prevent cutting of tarpaulins.

AUSTRALIAN GRAIN-LOADING REGULATIONS

(Made under the Navigation Act 1912–1920, and became effective October 1, 1923)

EXTRACTS

PART I

(3) In these Regulations unless the contrary intention appears—"grain" includes wheat, oats, maize, barley, rice, paddy, pulse, seed, nuts or nut kernels, or any mixture or combination thereof.

NOTE.—The Regulations, with certain exceptions of local import, "apply to every British or foreign ship carrying or loading at any port in Australia, grain either in bulk or in bags * * *."

NOTE.—Notice of intention to load grain must be given by master or owner to the deputy director.

PART III. GRAIN CARGOES

Division 1.—Bulk Loading

8. (1) Where bulk grain is loaded in any ship, shifting boards and feeders shall be erected in the ship to the satisfaction of the surveyor:

Provided that where the amount of bulk grain loaded is less than one-third of the ship's total deadweight cargo capacity, the provisions of these Regulations in regard to shifting boards and feeders shall not, unless the deputy director so directs, apply:

Provided further that if the grain is distributed in the various holds so that not more than one-third of the deadweight cargo capacity of any lower hold is contained therein, shifting boards or feeders shall not be required in that hold, but the grain shall be leveled off and secured from shifting by being covered with not less than four tiers of bags in the manner prescribed in Regulation 10 of these Regulations.

Provided also that if the grain is distributed in the various holds so that one-third or more, but not the whole of the deadweight cargo capacity of any lower hold is contained therein, feeders shall not be required in that hold, but unless the Deputy Director otherwise directs, shifting boards shall be required, and one-fourth of the grain shall be in bags, stowed as prescribed in Regulation 10 of these Regulations.

(2) Shifting boards, where fitted—

(a) shall extend from the upper deck to the floor, and shall be grain-tight, with grain-tight fillings between the beams, and shall extend to the top of all amidship feeders; and

(b) shall be properly secured, to the satisfaction of the surveyor, to stanchions, or, where there are no stanchions, between uprights, and shored or stayed in position. The scantlings of the shifting boards, uprights, shores, or wire stays shall be as prescribed in Schedule 1 of these Regulations.

(3) Except where otherwise specially approved by the surveyor, outer ends of shores of shifting boards shall be on the frames of the vessel, and not against the plating.

(4) All wood hatch feeders and wooden bulkheads shall be boarded on the inside.

(5) The ceiling of the holds shall be made thoroughly grain-tight, and the cement between the frames above the ceiling shall be made thoroughly sound and be free from cracks.

(6) No grain shall be loaded into any hold until the limbers have been cleaned and have been inspected by a surveyor.

(7) The grain shall be well trimmed into the wings and the spaces between the beams completely filled, and the ship shall be so loaded as to give sufficient stability. The ship shall not be overloaded.

9. (1) No bulk grain shall be carried in between decks or, where a ship has more than two decks, between the two upper decks, unless in feeders, properly constructed, to fill any orlop deck and the lower hold.

(2) For the purposes of this Regulation, the lower hold and the third or lowest deck may be considered as together constituting the lower hold if there are sufficient openings in the deck and the distance to the bulkheads does not exceed the distance prescribed in Regulation 15 of these Regulations.

(3) When trunked feeders pass through a 'tween deck, such feeders shall be well blocked off with grain in bags or general cargo, but if the vessel is too deep to carry any bagged grain or general cargo in the 'tween decks, the feeders shall be shored or properly secured to the satisfaction of the surveyor.

10. (1) Where in these Regulations bulk grain is required to be over-stowed for the purpose of securing it against sifting, not less than four tiers of grain in bags, or other approved cargo, shall be used, and in order to facilitate the stowing of the bagged grain or other cargo, at least 6 feet of space shall be left below the beams to the top of the bulk grain. Bagged grain used for this purpose shall be in sound bags, and be properly stowed with tiers laid close together.

(2) Before being over-stowed, the bulk grain shall be trimmed level and covered with two thicknesses of boards about 6 inches wide and 1 inch thick, the lower boards being placed fore and aft, and the upper boards athwartships, with spaces between the lower boards of not more than 3 feet, and between the upper boards of not more than 9 inches.

11. The use of grain-tight divisions, shifting boards, shores, and wire rope stays already fitted in the ship and in good condition shall be permitted if approved by the surveyor.

12. (1) Grain in poop, peaks, shelter, or bridge deck shall be contained in bags.

(2) Where grain is so carried, shifting boards shall be fitted deck to deck.

13. Steamships with a continuous hold, forward or aft, shall, if so required by the surveyor, have such hold divided transversely, to his satisfaction, either by means of a suitable bulkhead, or by means of bagged grain, built from the floor of the hold to the deck above.

14. (1) Hatchway feeders shall in every case, where fitted, contain grain in amount not less than 2½ percent of the total grain in the hold: Provided that where wing feeders are required to be fitted in the same compartment as a hatchway feeder, the wing feeders and hatchway feeder combined shall contain not less than 2½ percent, in the aggregate, of the total amount of grain in that compartment, the percentage of grain in each feeder being properly apportioned.

(2) When hatchway feeders are trunked, the sides and ends shall be grain-tight and strongly constructed of sound planks of approved size placed vertically and secured inside the hatch coamings, and stiffened and shored as the surveyor considers necessary.

(3) The feeders shall be divided longitudinally by fore and aft grain-tight shifting boards.

(4) Bunker hatches, if available, may with the approval of the surveyor be used as feeders where practicable.

(5) Subject to Regulation 15 of these Regulations, single-deck steamers with high hatch coamings may load full or part cargoes of bulk grain by utilizing the hatch coamings as feeders: Provided that where a hatch coaming above any hold is too small to accommodate 2½ percent of the total grain in that hold, or, where the prescribed distance from the hatchway feeder is exceeded, so much of the top of the bulk grain as is required by the surveyor shall be secured with grain in bags stowed as prescribed in these Regulations.

(6) When hatch coamings used as feeders extend into the hold a foot or more below the deck situated above the hold they feed, they shall, when required by the surveyor, have two 2-inch openings in the part below the deck between the beams at the sides, and holes the same distance apart on the ends of the coamings to allow the grain to feed into the wings and ends of holds.

(7) Wing feeders fitted in 'tween decks shall be strongly constructed and well secured, and shall contain, in the aggregate, grain in amount not less than 2½ percent of the quantity of bulk grain stowed beyond the prescribed distance from the midship hatchway feeders.

15. (1) Steamships with laid 'tween decks and carrying bulk grain shall be fitted with hatchway feeders.

(2) Where any part of a hold or compartment lies beyond a radius of 24 feet (or any less distance specified by the surveyor) from the nearest hatchway feeder either—

(a) A wing feeder shall be provided to feed that part; or
(b) If there is no opening in the 'tween decks for a wing feeder, the bulk grain in that part shall be secured by the over-stowing, in the prescribed manner, of not less than four tiers of grain in bags.

16. (1) Steamships of the type known as "turret," with single deck or single deck and beams, may load full cargoes of grain in bulk, but shall have shifting boards, and if required by the surveyor, trimming bulkheads forward and aft extending from deck to floor, or if coming under hatches, to top of coaming, as directed by the surveyor, and substantially fitted to his satisfaction. The loose grain in the end compartments shall be secured in the manner prescribed.

17. (1) Stokehold bulkheads and donkey recesses shall be sheathed with wood and made grain-tight, with an air space between the iron and the wood, when exposed to heat from the main or donkey boilers.

(2) Where the stokehold bulkheads and donkey boiler recesses are already properly sheathed, the surveyor may pass the vessel, but not less than 9 inches of air space will be required where the sheathing is to be erected or renewed.

(3) This Regulation shall only apply where the fires of the main or donkey boilers are liable to cause damage by excessive heat.

18. Where grain is carried in bulk in steamships having double bottom water ballast tanks, the latter shall be covered with a grain-tight platform (on 2½-inch by 3-inch scantling laid athwartships), made of two thicknesses of sound and dry planks each 1 inch thick, or of one thickness of planks 2 inches thick, but this platform may, if the surveyor so approves, be dispensed with where the top of the tanks are of heavy plates, and precautions to the satisfaction of the surveyor are taken against overflow from the bilges.

19. Steamships without ballast tanks, having a cargo platform in good order, shall not be required to fit a grain-tight floor over it, otherwise a grain floor to the satisfaction of the surveyor shall be required.

20. Any wooden or temporary bulkhead dividing a cross bunker from a hold compartment containing grain shall be supported, in a manner approved by the surveyor, against collapse due to pressure from the grain in the hold after the coal in the cross bunker has been worked out, thereby depriving the bulkhead of the support the coal would otherwise give.

Division 4.—Grain in Bags

35. (1) Where grain is carried in bags, shifting boards fitted to the satisfaction of the surveyor shall extend from deck to deck in the 'tween decks, and not less than 6 feet downward from the beams in the lower hold:

Provided that, except in special cases, steamships loading full cargoes of grain in bags in any hold or compartment shall not, unless the surveyor otherwise directs, be required to have shifting boards fitted in the lower hold.

(2) Before the cargo is loaded the limbers shall be thoroughly cleaned and the wooden ceiling and cement between the frames shall be sound and free from open cracks.

(3) The shifting boards required by sub-regulation (1) of this Regulation to be erected in 'tween-deck spaces may be constructed from hatches secured in stanchions or pillars, and in the case of ships without stanchions the hatches or planks may be fitted between two 4-inch by 4-inch uprights, tommed off top and bottom, or otherwise secured to the satisfaction of the surveyor.

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(4) If approved by the surveyor, fore and aft midship spaces under 8 feet in length may be exempted from the requirements as to shifting boards.

(5) In the way of the hatchways, the shifting boards may be secured to stanchions on each side of the square of the hatch or as otherwise approved by the surveyor.

36. The 'tween-hatches shall be left off when grain is carried in bags.

37. For the carriage of grain in bags in steamships—

(a) Unceiled tank tops shall have not less than 2 inches of dunnage laid over the tank tops consisting of two layers of 1-inch boards, the bottom layer to be laid athwartships 6 inches apart, and the top layer fore and aft 3 inches apart;

(b) One inch of dunnage boards 3 inches apart shall be laid over a strip of burlap covering the timbers from the tank tops to the inside of frames;

(c) Tank tops with laid ceiling shall have 1 inch of dunnage laid over the ceiling and covered with burlap, mats, or sails, extending across the floor from the turn of the bilge on each side of the ship;

(d) In the 'tween-decks, 1 inch of dunnage shall be laid athwartship from the wing to wing over a fore and aft board laid along each wing to form a waterway and the athwartship dunnage shall extend inside the line of frames, and burlap shall be laid over the 'tween-deck scupper holes to prevent loose grain finding its way to the bilges.

NEW ZEALAND GRAIN-LOADING REGULATIONS

(Extract From Consolidated Statutes of New Zealand)

219. (1) Where a grain cargo is taken on board any British ship, such cargo shall be contained in bags, sacks, or barrels, or other suitable package.

(2) In the case of any breach of this section, the master of the ship and any agent or owner who was charged with the loading of the ship or the sending of her to sea shall each be liable to a fine not exceeding £300, and the owner of the ship shall also be liable to the same fine unless he shews that he took all reasonable means to enforce the observance of this section, and was not privy to the breach thereof.

(3) For securing the observance of the provisions of this section any officer having authority in that behalf from the Minister, either general or special, shall have power to inspect any grain cargo and the manner in which the same is stowed, and for that purpose shall have all the powers of marine inspector under this Act.

(4) The Governor in Council may from time to time make Regulations respecting the loading of any British ship with any grain cargo in bulk.

(5) Until such Regulations are made, and subject thereto when made, it shall not be lawful to load any British ship with any grain cargo in bulk.

(6) For the purposes of this section—

"Grain" means any corn, potatoes, rice, paddy, pulse, seeds, nuts, or nut kernels.

"Grain cargo" means a cargo of which the portion consisting of grain is more than one-third of the registered tonnage of the ship; and that third shall be computed, where grain is reckoned in measures of capacity, at the rate of 100 c. f. for each ton of registered tonnage, and where the grain is reckoned in measures of weight, at the rate of 2 tons for each ton of registered tonnage.

AMENDMENT

37. Section 219 of the Principal Act (relating to grain cargoes) shall apply to a foreign ship which loads a grain cargo in New Zealand.

38. (1) Before a ship (whether British or foreign) laden in New Zealand with a grain cargo leaves her final port of loading in New Zealand, the master shall deliver or cause to be delivered to the Collector of Customs a notice stating—

(a) The kind of grain on board and the quantity thereof.

(b) The mode in which the grain cargo is stowed; and

(c) The precautions taken against shifting.

(2) If the master of any ship makes default in complying with the requirements of this section or makes any false or misleading statements in any such notice, he shall be liable to a fine not exceeding £20.

JUTE

Jute is a fiber obtained from an Indian plant which is used in the manufacture of burlap or gunnies, carpet backings, the base of linoleums, cordage, and other products. It is usually packed in pressed bales, each of which contains a number of bundles or skeins. The principal shipping point is Calcutta, from where it is carried to European and American destinations in both full and part-cargo lots.

Usually jute contains a considerable amount of moisture, owing partly to its method of preparation (maceration in water), and because of exposure to heavy monsoon rains. During the ocean voyage the moisture is liable to evaporate and condense on deck beams, frames, etc., which may result in sweat damage. To guard against this, several precautions may be taken. Before loading jute, care should be exercised to see that the holds are thoroughly cleaned and absolutely dry. All floors or decks should be well matted and all metal parts should be very thoroughly matted or dunnaged. Jute bales must on no account be allowed to contact condensed moisture on metal parts of the ship, as such contact will cause the fiber to rot.

Bales which are wet or damp should not be accepted, as they will almost inevitably give rise to damage. Jute should not be stowed in the same compartment with goods that are liable to heat or with goods that are liable to be damaged by moisture. The bales should be kept free of contact with oils or greases. Throughout the voyage, careful attention must be given at all times to ventilation of the cargo holds to prevent or minimize condensation and to get rid of evaporated moisture.

In addition to the danger of sweat damage, jute is a cargo that may easily catch on fire. It was at one time believed that jute was liable to spontaneous combustion, but this has never been proved and is still open to doubt. Many very serious jute fires have occurred, however, and every precaution should be taken to guard against fire from sparks, smoking, or other causes. The need for such precautions can be realized by the fact that if a flame comes in contact with a bale of jute, it will spread over the outside edge practically instantaneously.

Nothing in the regulations of the United States Department of Commerce, Bureau of Marine Inspection and Navigation, which deal with jute, shall be construed as preventing the enforcement of reasonable local regulations, such as those of the Board of Underwriters of New York, when such regulations are not inconsistent or in conflict with the provisions of the United States Department of Commerce regulations.

REGULATIONS OF THE BOARD OF UNDERWRITERS OF NEW YORK

Rules for Vessels Discharging Jute and Burlap

1. A shore watchman and a member of the crew shall be stationed in each compartment during discharge; these men to be the last out of the compartment and to "stand by" until all beams and hatches are on and in place. One corner hatch cover at each hatch shall be left open approximately 6 inches for observation purposes.

2. A responsible officer shall be on deck during discharge, and observe that a watch is being kept by the two men in each compartment discharging.

3. A. During meal hours with hatches off, an officer shall be on deck to prevent smoking and "No Smoking" signs shall be hung up in conspicuous places on the steamer's deck.

B. In the daytime when no discharging is being done due to rain or other causes and on Sundays when hatches are closed, a strict watch must be kept on the openings provided at each hatch for observation purposes in case of fire. A record to this effect must be made in the log book.

4. All ventilators leading to compartments where burlaps, jute, cotton, rags, or cargo of inflammable nature is carried shall have the openings canvas-covered or plugged.

(For the purpose of this rule the term "compartment" shall be taken to include all holds or compartments between bulkheads running up to the weatherdeck.)

5. Ships discharging burlaps and jute shall have all stove-pipe exists on deck covered with fine mesh wire spark arrestors.

6. A barrel, full of water, with buckets, shall be kept on deck at each hatch discharging burlaps or jute, and in the winter time an approved anti-freezing mixture should be added to the water.

7. Ship's hose shall be laid and ready for instant use. Steam fire extinguishing valves and lines shall be tested every voyage prior to loading, and shall be put into efficient working condition and a proper record to this effect noted in the log book.

8. Hose of sufficient length to reach hatches shall be laid from the dock hydrants to each end of the steamer.

9. Decks shall be illuminated at night by proper cargo lights or clusters hung at each end of the steamer.

Vessels Discharging at Ports Other Than New York

10. A strict night watch is to be kept on the vessel, and the watchman is to be instructed that hatches must be inspected at half-hourly intervals throughout (one corner of each hatch to be left open for this purpose, as per Rule No. 1) and a notation to this effect is to be written in the log book.

LIVESTOCK

The carriage of livestock by sea is governed by laws and regulations issued by most of the principal exporting and importing countries. In the United States the Bureau of Animal Industry, Department of Agriculture, prescribes the regulations, and these are given below. In the United Kingdom, the Board of Agriculture and Fisheries issues and amends orders governing the carriage of live animals. Canada also issues regulations, as does the Argentine Republic, in which country authority is vested in the Division of Animal Industry, Department of Agriculture. Ship-owners or operators and masters of vessels engaging in the carriage of livestock from these countries should acquaint themselves with the regulations in force. (Fig. 66.)

Following is a republication of the regulations of the United States Department of Agriculture, which is authorized by law to establish such rules. These regulations became effective September 1, 1930.

REGULATIONS OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, BUREAU OF ANIMAL INDUSTRY

General Provisions

Definitions

Regulation 1.—Whenever in these regulations the following words, names, or terms are used they shall be construed as follows:

Department.—The United States Department of Agriculture.

Bureau.—The Bureau of Animal Industry of the Department.

Inspector.—An inspector of the Bureau.

Accredited veterinarian.—A veterinarian accredited by the Bureau for testing accredited herds.

Animals.—Horses, cattle, sheep, swine, and goats.

Horses.—Horses, mules, and asses.

Poultry.—Domestic fowls.

Lumber.—Sound hard pine, spruce, oak, or other hardwood.

Inspection and Certification

Regulation 2. Section 1.—No animals shall be exported from the United States to a foreign country until they have been inspected in the manner prescribed by the chief of bureau and found to be free from evidence of communicable disease or exposure thereto, and until they have been tested in

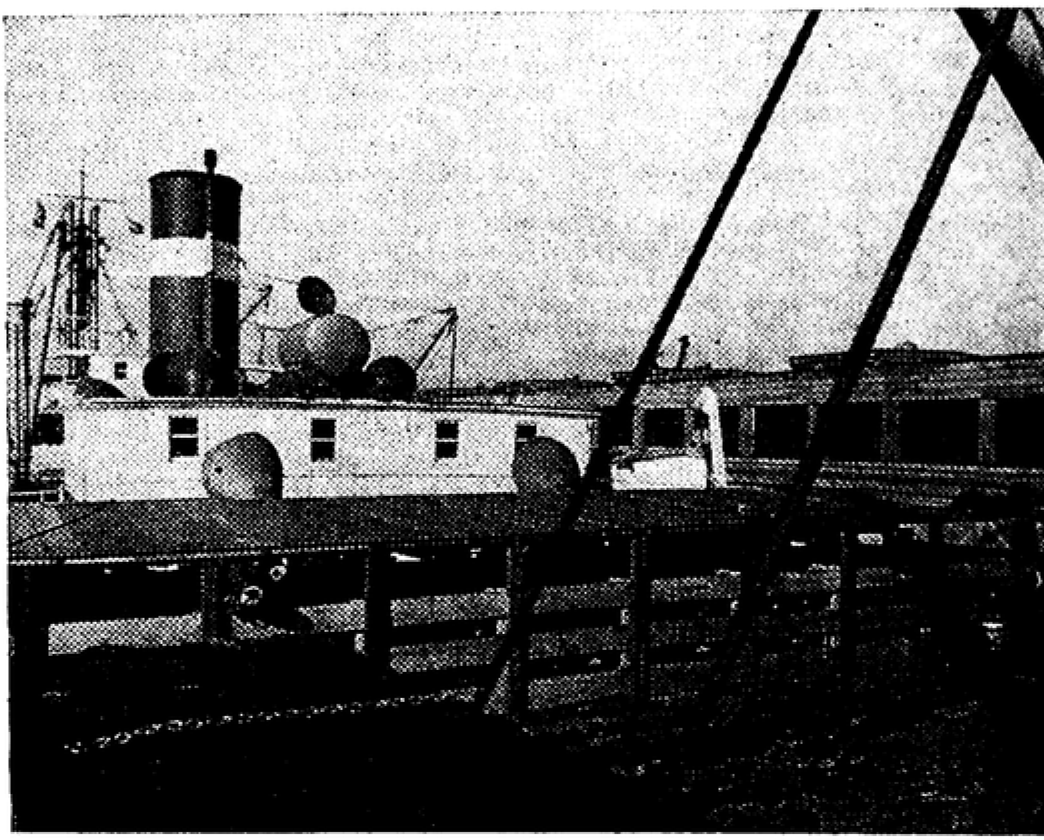

Figure 66.—Stalls on deck for livestock.

the manner provided by these regulations if they are of a class required by regulation 3 hereof to be tested. If, upon inspection, they are found to be free from evidence of communicable disease or exposure thereto, they shall be accompanied by a certificate to that effect signed or indorsed by a bureau inspector, unless they are destined to a country with reference to which the Secretary of Agriculture shall have waived the requirement of such a certificate.

Sec. 2.—Owners or masters of vessels carrying animals from the United States to a foreign country shall provide such animals with space, ventilation, fittings, food and water supply, and other facilities as hereinafter set forth: *Provided, however*, That shipments of animals to Canada, Mexico, Central America, and countries of the West Indies shall be subject to such requirements only as the chief of bureau shall prescribe as to space, ventilation, fittings, food, and water supply. Such owners or masters shall not accept for transportation any animals found by a bureau inspector to be in an unfit condition for such transportation.

Tuberculin Test for Dairy and Breeding Cattle

Regulation 3.—No dairy or breeding cattle shall be exported from the United States to a foreign country unless they shall have passed a tuberculin test applied either by a bureau inspector, a duly authorized representative of the country to which the animals are to be exported, or an accredited veterinarian, in which case the test chart shall be indorsed by a bureau inspector in charge of tuberculosis-eradication work in the State of origin: *Provided, however,* That the requirement of a tuberculin test may be waived upon presentation to the inspector by the exporter of a written permit of an authorized representative of a foreign government to ship a specified lot of cattle to that particular country without said test.

Ports of Export

Regulation 4.—Inspection will be maintained at the following ports: Portland, Me.; Boston, Mass.; New York, N. Y.; Philadelphia, Pa.; Baltimore, Md.; Norfolk, Va.; Jacksonville, Fla.; New Orleans, La.; Galveston and Houston, Tex.; San Diego, Los Angeles, and San Francisco, Calif.; Portland, Oreg.; and Tacoma and Seattle, Wash. Other ports may be designated in special cases by the chief of the bureau.

Disinfection of Cars and Other Conveyances

Regulation 5.—Animals destined to a foreign country shall be transported from the point of inspection to the ocean vessel in cars or other conveyances which have been cleaned and disinfected to the satisfaction of an inspector after the animals have been inspected in accordance with the requirements of regulation 2: *Provided, however,* That express cars and other conveyances not regularly used for the transportation of livestock need not be so disinfected. If such animals are so transported in crates, the crates shall either be new and previously unused, or shall be cleaned and disinfected (to the satisfaction of an inspector) prior to receiving such export animals.

Rest and Inspection Before Embarkation, Loading, etc.

Regulation 6.—No animals shall be loaded upon a vessel for exportation until they have been allowed at least five hours' actual rest in suitable quarters at the port of embarkation: *Provided, however,* That a period of rest will not be required at the port of embarkation if the animals were transported thereto in cars in which there was opportunity to rest, and proper feed and water were provided in compliance with the requirements of the 28-hour law (U. S. Code, title 45, secs. 71–74), or when the time of transportation between the point of origin or place where last fed, watered, and rested in transit and the port of embarkation does not exceed 12 hours.

All animals specified in this regulation shall remain a sufficient length of time and under conditions at the port of export to afford proper inspection during daylight. The place of detention for rest and inspection shall be subject to approval of the inspector. Movement of animals from the holding yards, pens, or stables to the transporting vessel and their loading, storing, and tying shall be performed under such careful supervision and restrictions as the inspector may direct.

Headropes and Halters

Regulation 7.—Horses shall be provided with proper halters and ropes for handling and tying. Halters, ropes, or other suitable equipment satisfactory to the inspector shall be provided for the handling and tying of cattle.

Space on Vessels

Regulation 8.—Except as specified in regulation 9 of this order, space on vessels for the various animals covered by these regulations shall be as follows:

Horses.—Horses shall have not less than 6 feet 3 inches clear vertical space from beams of deck or roof overhead to flooring underfoot. Each horse shall be allowed an individual space of not less than 2 feet 6 inches in width by not less than 8 feet in depth, provided—

(1) That additional space shall be furnished for very large horses and for mares in foal.

(2) That upon application, to the inspector, of the owner of the horses or his agent, four horses may be placed in regulation pens not less than 10 feet in width by 8 feet in depth. Stallions and mares in foal, however, shall be shipped only in separate stalls.

(3) That, subject to the approval of the inspector, from five to seven horses or mules not exceeding 500 pounds each in weight may be shipped untied in pens having a width of not less than 10 feet and a depth of not less than 8 feet.

(4) That upon approval of the inspector the 8-foot depth of stalls for horses may be reduced to 7 feet for medium-sized horses in order to avoid losing a row of stalls in the forward and aft ends of the ship, abreast of hatches, alongside of engine and boiler casings, etc.

Additional stalls distributed in the different compartments or decks in which horses are carried shall be provided for use as hospital stalls for sick or disabled horses, as follows:

One stall not less than 2 feet 6 inches in width by 8 feet in depth for the first 4 to 10 horses shipped; 1 additional like stall for any number of horses in excess of 10 up to and including 25; and an additional like stall for each additional 25 horses or fraction of that number.

Cattle.—Cattle shall have at least 6 feet vertical space by not less than 8 feet depth on all decks free of all obstructions except that, subject to approval of the inspector, cattle may be placed on raised floors over pipes and over similar obstructions where the vertical space is not less than 5 feet 6 inches from underedge of beam overhead to flooring underfoot. Cattle over 850 pounds in weight shall each be allowed a space of 2 feet 6 inches in width by 8 feet in depth, and no more than 4 head of such cattle shall be allowed in each pen, except at the end of rows, where 5 may be allowed together. Cattle of 850 pounds' weight or less shall each be allowed a space of at least 2 feet in width by 8 feet in depth, and 5 may be allowed in each pen. Calves and young stock or yearlings may be stowed at the discretion of the inspector. Cattle standing between stanchions, sounding tubes, ventilators, and other obstructions, though in continuous pens, shall each be allowed a space of 3 feet in width by 8 feet in depth. Cattle carried in single stalls shall each be allowed not less than 3 feet in width by 8 feet in depth. Additional space and separate stalls shall be provided when required by the inspector for large dairy and breeding cattle and for cows in advanced pregnancy. Large cows, in the discretion of the inspector, may be placed 3 in a pen of 10 feet in width by 8 feet in depth.

Sheep and goats.—The space for each sheep or goat shall be 4 feet long by 14 inches wide: *Provided, however,* That for lambs or goats under 100 pounds in weight the space need not exceed 4 feet by 12 to 13 inches. Space for sheep and goats for breeding purposes shall be not less than 5 feet in length by 20 inches in width.

Sheep pens shall have a clear vertical space of not less than 3 feet. One single deck of sheep may be carried upon the roof over cattle when said roofs meet the requirements of regulation 16. Sheep pens shall not exceed 20 feet by 8 feet where two tiers are carried.

Swine.—The space for swine not exceeding 150 pounds in weight shall be the same as that specified for breeding sheep and goats, and for those under 100 pounds in weight the same as for lambs and for goats of less than 100 pounds in weight. Additional space and suitable pens shall be provided when required by the inspector for unusually large hogs or for swine for breeding purposes.

Crates and Portable Stalls

Regulation 9.—Small numbers of cattle, sheep, goats, and swine may be carried in crates or portable stalls which meet the space requirements of regulation 8 of these regulations and are so constructed as to afford comfort and security. Small numbers of horses may be shipped in crates or portable stalls of sufficient size and strength to carry them safely. All crates and portable stalls shall be properly equipped for feeding the animals carried therein and shall be subject to the approval of the inspector.

Where animals are carried in crates or portable stalls on upper or exposed decks, provision shall be made for a suitable roof for each crate or stall to afford protection against seas and weather conditions.

Hatches

Regulation 10.—No animals shall be loaded upon hatches on decks above animals, nor shall any merchandise, freight, or feed for animals be loaded upon said hatches, but said hatches shall at all times be kept clear.

In loading animals upon exposed decks, such as bridge, spar, well decks, etc., where hatch coamings do not exceed 2 feet in height at center of hatch, animals may be placed on hatches, provided that on all hatches on upper decks sufficient space be left clear so that entrance to deck beneath may be possible at all times. There shall also be left clear on all hatches, under which hay and feed are stowed, space for the proper removal and handling of same.

When carried in the 'tween decks, animals may be placed on hatches. In no case shall horses be allowed on hatches when the vertical space between beams or coamings overhead and flooring underfoot is less than 6 feet 3 inches.

In no case shall cattle be placed on hatches when the vertical space between beams or coamings overhead and flooring underfoot is less than 5 feet 6 inches.

When animals are carried on third or steerage deck, they may be carried on third-deck hatches.

In carrying animals on underdeck hatches, sufficient space shall be left clear on hatches for passageway across ship, for proper removal and handling of hay and feed, and also for brow.

Upper-Deck Fittings

Regulation 11.—No animals shall be carried upon the upper decks where the outside rails or bulwarks are not of sufficient strength to hold fittings securely and measure less than 3 feet in height from the deck. When animals are carried upon the upper decks bulkheads shall be erected at all unprotected ends of stalls.

Protection from Heat of Boilers and Engines

Regulation 12.—No animals shall be stowed along the alleyways by engine and boiler rooms, unless the sides of said engines and boiler rooms are covered by a tongue-and-groove tight sheathing, making a 3-inch air space.

Alleyways

Regulation 13.—Alleyways in front of and between pens used for feeding and watering cattle shall have a width of 3 feet; however, for a distance not to exceed 12 feet at end of alleyways in bow and stern of ship, and where obstructions less than 3 feet in length occur, in width may be reduced to a minimum of 18 inches. Alleyways in front of and between pens used for feeding and watering horses shall have a minimum width of 4 feet except in bow and stern of ship, where the alleyways may be reduced to a width of not less than 3 feet. Two or more athwartship alleyways at least 18 inches wide in the clear shall be left on each side of upper deck, so that the scuppers can be readily reached and kept clear of obstructions. Three or more alleyways at least 18 inches wide shall be left open on each side in 'tween or other under decks, where deck is not divided into compartments. Where 'tween or other under decks are divided into compartments, one or more athwartship alleyways, 18 inches wide on both sides of ship and in every compartment shall be left clear and open so that the scuppers can be readily reached and cleared of all obstructions. In forward compartments the alleyways to scuppers shall be placed at after end of compartments. In after compartments the alleyways to scuppers shall be in forward ends of compartments. Athwartship alleyways not less than 2 feet in width shall be provided where necessary so that the attendants may cross ship's deck with feed and water for animals and for other purposes. When animals are not carried in the decks beneath, passage from side to side of ship can be made by crossing over hatches where the coamings do not exceed 18 inches in height. Sufficient space shall be left at the sides of hatches to permit of the feed in decks beneath being readily removed and handled. Where animals are carried in underdecks, proper brows, or runs, shall be placed in hatches, on which animals may be walked in loading or discharging. Where horses are carried on upper deck and in under deck, said brows shall remain shipped in hatches, so that horses may be led from deck to deck during voyage.

Fore-and-aft alleyways of the same character as those specified in this regulation for cattle shall be provided in front of and between all pens used for feeding sheep, goats, and swine, and athwartship alleyways not less than 18 inches in the clear shall be provided at ends of 20-foot pens for all double tiers.

Stanchions

Regulation 14.—Stanchions as follows shall be provided for all stalls and pens for horses, cattle, sheep, goats, and swine:

Horses and cattle.—Iron stanchions shall not be less than 2 inches in diameter, set in iron sockets above and below, and fastened with ⅝-inch bolts.

Except as hereinafter provided, wooden stanchions shall be of 4 by 6 inch lumber set at 5 feet from centers against the ship's rail or at points midway between two animals, and inside stanchions in their proper place shall be in line with outboard stanchions and set up so that the 6-inch way of the stanchions shall set fore-and-aft. Each outboard stanchion shall be fastened to the rail or bulwark by means of a ⅝-inch iron hook bolt with hook on outboard end to pass over and under rail or bulwark and through outboard stanchion and set up on inside of same with a washer and nut. Stanchions shall be of not less than same height as the required vertical space for horses and cattle, respectively, and butt up square to beams with 2 by 4 by 8 inch cleat butted against both sides of stanchions and well nailed to beams and 1 by 6 by 24 inch angle braces properly placed and nailed to secure each stanchion to its beam. Inboard stanchions supporting roof fittings shall be 2 inches higher than outboard or rail stanchions.

A piece 2 by 3 inches, or 2-inch plank, shall be fastened to the outside of the outboard stanchion and run up to underneath the rail to chock down the stanchion and prevent lifting when the beam is sprung to the crown of the deck. Open-rail ships shall be blocked out on backs of stanchions fair with the outside of rails to receive the outside planking. Where upper-deck fittings are not permanent, the heels of outside stanchions shall be secured by a bracing of 2 by 3 inch lumber from the back of each stanchion to sheer streak of waterway, the heels of inside stanchions being properly braced from end to each other. In amidship fittings and where fittings are brought forward to clear rigging bitts, etc., the rump-board stanchions may be 3 by 4 inch, braced or cleated to beam or roof or deck as required.

Stanchions on under decks may be set 7 feet 6 inches from centers, for three animals, provided the space for animals is 2 feet 6 inches per head. If space for animals is more than 2 feet 6 inches per head, the distance between stanchions may be changed accordingly. Thus, if two cattle or horses are given 4 feet each, stanchions may be set at 8-foot centers and driven tight between the decks, securely braced with 2 by 3 inch raking shores from stanchion to stanchion and sides of ship. If one or both decks are of wood, then the stanchions may be secured by cleating well to one or both decks, at heads and heels of same. When 3 by 10 inch breast boards are used, 4 by 6 inch stanchions may be set at 10-foot centers.

Sheep, goats, and swine.—Except as hereinafter provided, pens shall be equipped with stanchions of not less than 3 by 4 inch lumber, set at 5-foot centers, the 4-inch way of stanchions fore-and-aft, with 1½ inch shoulder gained on stanchions to receive beams.

On well decks and other exposed decks outboard stanchions shall be cut not less than 4 inches higher than bulwark and the hook bolted to the rail with ⅝-inch hook bolts in the same manner as provided in this regulation for horse and cattle stanchions. When bulwark on well decks is of sufficient height to permit of beams running underneath the head of rail, this shall be done by cutting out 1½ by 4 inches of side of stanchion at that point, allowing beam to run through to underneath the head, thus forming chock to prevent fittings lifting. For single-tier pens on exposed decks braces of 2- by 3-inch lumber shall run from heels of front stanchion to hatch coamings, winch beds, etc.

On open-rail ships the backs of rail stanchions shall be filled out to flush with outside of rail to receive the outside planking.

Where two tiers of sheep, pigs, or goats are carried on upper or exposed decks, the stanchions beams and their attachments shall be as required for horses and cattle.

Where sheep pens are placed over cattle fittings, outboard stanchions not less than 4 by 4 inch lumber shall run up through the cattle-fittings roof and

be secured by bolting through outboard cattle stanchions with not less than 3⅝-inch bolts. Similar inboard stanchions shall be securely nailed and cleated to the roof of cattle pens.

Beams

Regulation 15.—*Horses and cattle.*—Except where stanchions are driven tightly between the decks or otherwise secured by cleating to wooden decks as specified in regulation 14, a beam shall be provided for each athwartship line of stanchion. Beams shall be 3 by 6 inch lumber. Those at the ends of fittings and each alternate one shall extend clear across the ships beam or abut against house or other permanent deck fittings. Intermediate short beams are not to extend beyond the inner edge of the roof.

Sheep, goats, and swine.—Where two tiers of pens are constructed on upper or exposed decks, beams shall be provided as specified in this regulation for horses and cattle. Beams of 3 by 4 inch lumber set on 3-inch side and bolted to stanchions with ⅝-inch bolts shall be provided to support the roof of single-tier pens on exposed decks and the floor of upper double-tier pens on all decks. Beams under upper-tier pens shall be supported in centers by 2 by 3 inch pieces run from deck to underside of beams.

Roofs

Regulation 16.—All pens for carrying horses and cattle on exposed decks shall be roofed with 1⅛-inch lumber, tongued and grooved and laid fore-and-aft from the outside planking to 2 feet beyond the line of breast boards, driven tightly together and nailed to the athwarthship beams.

Flooring

Regulation 17.—*Horses and cattle.*—On temporarily fitted ships dairy and breeding cattle shall be placed on raised flooring, as hereinafter described. Ships with iron decks shall be sheathed with 1 or 2 inch lumber. Sheathing will not be required on ships with wooden decks, provided proper footlocks are secured to the deck. Cement diagonally scored one-half inch deep may be used on iron decks instead of wooden sheathing if the footlocks are molded in the same and bolted to the deck. Except as otherwise provided in this regulation no raised flooring less than 2 inches in thickness shall be used and it shall be nailed to scantling 2 by 3 inches laid athwartship on the deck not more than 2 feet 6 inches apart. Such flooring may be in two or three sections in the depth of the stalls, so as to provide for its removal and relaying after cleaning and disinfecting of decks and fittings; for dairy and breeding cattle 1¼ by not less than 8 inch lumber may be used, nailed to 2 by 3 inch scantling placed underneath not more than 2 feet 6 inches apart. This flooring may be laid in portable sections, as hereinbefore described for 2-inch materials.

Sheep, goats, and swine.—On all temporarily fitted ships sheep, goats, and swine shall be carried only on wooden decks or wooden flooring, as hereinafter provided. Where wooden decks are used, footlocks as specified in regulation 18 shall be secured to the deck. On other than wooden decks flooring for lower tiers shall be of not less than 1-inch lumber raised 2 inches by nailing to 2 by 3 inch lumber laid athwartship on the deck not more than 2 feet 6 inches apart. Where a single tier is built on top of cattle pens the roof of the cattle pens shall serve as a floor for the animals. Where two tiers of pens are to be used, the flooring of the upper tier shall be made of 1⅛-inch lumber, tongued and grooved, driven closely together and nailed to the beams beneath.

Raised flooring.—Raised flooring of 2-inch plank shall be laid over steering gear for all animals when found necessary by the inspector.

Footlocks

Regulation 18.—Footlocks shall be provided for all pens in which animals are carried.

Horses and cattle.—Except as hereinafter provided, footlocks for horses and cattle shall be of 2 by 4 inch lumber laid flat side down and fore-and-aft and

placed 12 inches, 14 inches, 2 feet 2 inches, and 14 inches apart, the first one distant 12 inches from the inside of footboard. Where temporary fore-and-aft footlocks are used, they shall be filled in athwartship opposite each stanchion, properly secured to sheathing or deck, and secured by a batten of 2 by 3 inch lumber, to go over all from stanchion to stanchion. This batten must be in one piece. Pieces 2 by 3 inches must be nailed on stanchions or backing over batten to prevent floor raising. These pieces over battens over all will not be required in underdecks. When permanent footlocks, securely bolted to decks, are used, the athwartship braces between footlocks from stanchion to stanchion and batten may be omitted when the stanchion is securely fitted in iron socket bolted to the deck. A space of 2 inches shall be left between the ends of athwartship footlocks and fore-and-aft footlocks when the former are securely bolted to the deck. When the fore-and-aft footlocks are permanent, a 3-inch space shall be left between the ends at end of each section.

Where dairy and breeding cattle are carried between decks, footlocks as hereinbefore specified may be of 1 by 4 inch lumber.

Sheep, goats, and swine.—Pens for sheep, goats, and swine shall be provided with footlocks of 1 by 2 inch lumber laid flat side down fore-and-aft with four strips at equal distances apart through depth of pen, provided that the lower pens of double tiers shall be equipped with footlocks of 2 by 4 inch lumber placed as provided in this regulation for cattle.

Outside Planking

Regulation 19.—All pens for carrying animals on exposed decks shall be provided with outside planking of not less than 1⅛-inch tongue-and-groove lumber laid fore-and-aft of ship driven tightly together and securely nailed to backs of stanchions in a manner to cover all open spaces properly: *Provided*, That during warm weather the top-course planking may be left off fore-and-aft of ship in order to allow a free circulation of air. Outside planking may be laid in mill-run lengths, butts to be broken, and reinforced with 1⅛-inch lumber, forming butt straps, these to be well nailed and nails clinched.

Breast, Front, and Foot Boards

Regulation 20.—*Horses and cattle.*—Breast boards shall be of not less than 2¾ by 9¾ inch, dressed, or 3 by 10 inch lumber in the rough, provided that breast boards may be of not less than 1¾ by 9¾ inch lumber dressed, or of 2 by 10 inch in the rough when the distances between centers of breast-board stanchions are not more than 8 feet. All breast boards shall butt on the stanchions and an iron plate one-fourth of an inch in thickness and 3 inches square be placed over the boards like a butt strap, ⅝-inch bolt pasing through same. All breast boards shall have 1-inch holes bored through them at proper distances for tying animals. Proper gates or openings in breast boards shall be provided at convenient distances in order to allow animals to be loaded and moved from pens when necessary. These shall be formed of breast boards and be properly cleated with wood or iron cleats, with stop or chock over top of breast board to prevent raising. All pens shall be provided with footboards of not less than 2 by 9 inch lumber and shall be properly nailed or bolted to stanchions.

Sheep, goats, and swine.—Front boards shall be of 1 by 6 inch lumber and sufficient in number to secure the animals properly in the pens. Provisions shall be made for removing a section of front boards at each pen to allow loading and unloading of the animals.

Rump Boards

Regulation 21.—*Horses and cattle.*—Rump boards shall be provided for horses and cattle, and when covering bitts, rigging, braces, or other obstructions located at a distance from ship's sides they shall be brought forward to cover same, with a solid partition behind the animals; and when necessary to extend fittings opposite bitts, rigging, braces, etc., fittings for two or more animals shall be brought forward. Rump boards in such cases shall be not less than 1⅛ inches in thickness, tongued and grooved and built to a height of 4 feet 6 inches from the deck. Where deck is clear and without obstructions, such as braces, etc., rump boards may be set on the inside of rail stanchions. In such case and where beef cattle stand rump to rump amidship stalls 18 inches (or two boards of 1⅛ by 9 inches) of tongue-and-groove lumber shall be used. In 'tween decks, when

ship's ribs are of the bulb-edge type, or of channel-iron type, the above-mentioned rump board may be used. When ribs ae of the thin-edge type close backing shall be run down, same as in offsets on upper deck, or ribs may be covered with wood. Where ship's cargo battens are in good order same may be used as backing or rump boards by filling in spaces between when necessary.

In case stalls or pens are built alongside of hatches, rump boards shall be carried down to the line of coaming.

Sheep, goats, and swine.—Pens for these animals on all exposed decks shall be provided with an inner backing, as required in this regulation for horses and cattle, extending from the floor to a height of not less than 2 feet 6 inches; *Provided*, however, That not less than 1-inch lumber may be used for this purpose.

Division Boards

Regulation 22.—*Horses.*—There shall be from 1 to 4 or more division boards for horses. They shall be portable and be not less than 2 by 9 inches of lumber, dressed on both sides, with top edges rounded, and placed horizontally between the horses with 3-inch openings between. They shall be four in number at ends of hatches, passageways across ship, and at alleyways to scuppers.

Cattle.—Division boards for cattle shall be of lumber not less than 2 by 8 inches and so arranged as to divide the animals into lots of four, except at the ends of rows as provided in regulation 8, thus making compartments for that number all over the vessel. Division boards shall be four in number at ends of hatches, passageways across ship, at alleyways to scuppers, and for dairy and feeding cattle, whether divided into lots of four or placed in single stalls. All division boards shall be portable and, for dairy and breeding cattle, placed horizontally with 3-inch openings between. For other than dairy and breeding cattle, division boards may be two in number, placed perpendicularly.

Sheep, goats, and swine.—Division boards and those forming ends of pens shall be as provided for front boards for sheep, goats, and swine in regulation 20 of these regulations.

Troughs and Hayracks

Regulation 23.—All pens shall be equipped with proper troughs and hayracks, as hereinafter provided.

Horses.—Removable separate troughs shall be provided for horses. They may be of wood or metal and shall be provided with hooks for hanging on breast board.

Cattle.—When flooring is raised to form bottom of trough, troughs may be provided for cattle by placing footboard on outside of front stanchion and a 2 by 3 inch scantling on 2-inch edge on first footlock, provided that in 'tween-decks when footlocks are of 1 by 4 inch lumber the said scantling shall be of 2 by 4 inch dimensions. When flooring is not raised in stalls the section between foot-boards and first footlock shall be raised 2 inches, thus forming the bottom of troughs, the footlock to be built up properly to form inner side of trough. Metal troughs meeting approval of the inspector may be used in lieu of the aforementioned wooden troughs.

Sheep, goats, and swine.—Troughs for sheep, goats, and swine, shall be constructed with sides and ends of 1 by 6 inch lumber nailed to pieces of 1 by 8 inch lumber for bottom board and be fastened between stanchions on fronts and ends of stalls. Suitable hayracks shall be provided for sheep and goats. They shall be made of 1 by 2 inch strips of lumber placed fore-and-aft and along the athwartship partitions by nailing to angle braces of 2 by 3 inch lumber nailed to stanchion and beam. Each pen for sheep and goats shall be equipped with a suitable water-tight vessel for watering the animals.

Defective Fittings

Regulation 24.—In the case of previously used fittings the inspector may, in case he finds that any of the fittings are worn, decayed, defective in construction, or apparently unsound, require replacement of the same before permitting their use.

Cleansing of False Decks and Temporary Troughs

Regulation 25.—False decks upon which animals are loaded and temporary feed troughs shall be removed, and all the manure and dirt shall be removed from underneath, and the decks and troughs shall be disinfected before they are used to receive another load of animals.

Ventilation

Regulation 26.—Each underdeck compartment not exceeding 50 feet in length shall have at least four bell-mounted ventilators of not less than 18 inches in diameter and with tops exceeding 7 feet in height above shelter deck, two situated at each end of the compartment. Compartments over 50 feet long shall have additional ventilators of the same dimensions or efficient fans. Animals shall not be placed at greater distances than 10 feet beyond ventilators. When the fittings on upper decks are permanent and hatches overhead are provided, the same regulations for ventilation shall apply as provided for underdecks.

Lighting

Regulation 27.—All vessels carrying animals shall have electric lights available at all times for the proper attending of all animals.

Feed and Water

Regulation 28.—*Feed.*—Owners of animals or their agents shall provide a sufficient amount of suitable feed. Owners of vessels carrying animals shall have all feed placed under hatches and, so far as possible, in holds contiguous to the animals on board, provided that not more than two days' feed may bé allowed on the shelter deck when it does not interfere with the proper care of the animals and it is properly covered. It shall be the first used. No feed shall be stored on top or inside of sheep pens.

Water.—Owners of vessels carrying animals shall have each vessel equipped with water condensers in good working order and of sufficient capacity to provide 8 gallons of fresh, cold water each 24 hours for each head of horses and cattle in addition to any amount required by other animals on board and for other purposes. Where vessels are not equipped with pipes for watering animals, casks or hogsheads shall be provided of not less than 400 gallons' total capacity for each 100 head of cattle and horses, and an additional amount in equal proportion shall also be carried for sheep, goats, and swine. These containers shall be filled with fresh water before sailing and refilled as emptied. All water tanks for use of animals shall be filled with good, fresh water before sailing.

Attendants

Regulation 29.—Sufficient attendants, as herein specified, shall be provided by the shipper or by the owner of the vessel. The employment of attendants shall be subject to the approval of the inspector, and after such approval they shall be signed as members of the ship's crew. They shall be furnished with heated, well-lighted, and well-ventilated quarters and with bedding and table utensils. Experienced foremen shall be in charge of the animals. The attendants shall be assembled a sufficient time before the sailing of the steamer for the inspector to examine them. The examination shall be made before the signing of the ship's articles by the attendants, who shall give evidence—

(1) That they know for what purpose they are employed and the duties that will be required of them.

(2) That they are able-bodied and physically competent to perform the duties required.

(3) That they have sufficient knowledge of English to make themselves understood or to understand orders given them.

The number of attendants shall be as follows:

For horses.—One attendant to each 22 head.

Cattle.—One attendant for each 35 head where steamer has water pipes extending entire length of both sides of compartments.

One attendant for each 25 head if steamer does not have water pipes extending the entire length of both sides of compartments.

One attendant for each 50 head when steamer has water pipes extending entire length of both sides of compartments, with not less than 3 feet in width of alleyways, and when a competent watchman in addition to attendants is on duty at night.

One attendant to each 35 head upon steamers not equipped with water pipes extending the entire length of both sides of compartments, with a watchman on duty at night.

One additional attendant who is a capable milker to each 15 head of fresh cows and forward springers.

Sheep and goats.—One attendant for each 150 head during the winter season (October 1 to March 31).

One attendant to each 200 head during the summer season (April 1 to September 30).

Swine.—One attendant for each 50 head.

LUMBER

Lumber or timber cargoes are important in ocean trade and are carried both as full and part cargoes, under which headings they are discussed in this section. When a full cargo of lumber is carried, it is customary to stow part of the load on deck, as an underdeck cargo alone does not bring the average vessel anywhere near down to its marks. The British regulations covering the carriage of deck loads of lumber are given in the Appendix to this publication.

Lumber measurements are the most complicated of any used in connection with ocean shipping. For weights and measures used in the various important trades, see the section on Weights and Measures Used in Shipping, in appendix. The stowage factors of the principal kinds of lumber are given in the tables of stowage factors under the heading "Lumber."

FULL CARGOES

In general, the type of vessel most suitable for the carriage of full cargoes of lumber is one which has a wide beam in relation to its draft, and one which has good open holds as free as possible of obstructions such as stanchions, pillars, or broad web frames. Most of the timber carried in overseas trade is transported in full cargo lots, and many vessels have been specially constructed for the particular timber trade in which they are to be engaged.

A formula that is frequently used to estimate the underdeck lumber capacity of a vessel is as follows:

$\frac{\textit{Bale capacity} \times 100}{12}$ = approximate underdeck capacity in board feet. Divide the result of the above computation by 1980 to obtain the underdeck capacity in Petrograd standards.

With regard to the size of the deck load that a given vessel will carry when not restricted (as by the British regulations governing carriage of deck loads in the winter months), Bridger and Watts[6]

Naturally the amount of deck cargo a vessel will carry depends entirely on what she has below or underdeck, and her stability.

A single deck ship of say 7,500 tons d.w. (about 380 feet in length and 52 feet in breadth) should carry a deck load of, e. g., 750 to 1,000 mille, and range from 15 to 17 feet in height—this refers to a 3-island vessel, and a 'tween-deck ship should carry almost as big a deckload.

A shelter decker, however, is a different proposition, for one must remember that the main deck is below. Generally speaking one should get from 8 to 11

[6] Bridger and Watts, p. 181, op. cit.

feet above the shelter deck; or a rough estimate would be that the height of a deck load of a shelter decker is a two thirds of the height of the shelter deck deducted from what a single deck ship would lift. For example, assuming a ship had a 9-foot shelter deck and a similar sized single decker carried a 16-foot deck cargo, the shelter decker would take about a 10-foot deck load on the open deck.

The principal full-cargo lumber trades are those known as the Baltic, White Sea, and North Pacific trades. Considerable quantities of lumber are also carried in full-cargo lots from eastern Canada, principally to the United Kingdom.

The Baltic Trade

In the Baltic trade numerous relatively small vessels are used which commonly carry coal from the United Kingdom to the various Scandinavian and Baltic countries and return with cargoes that are usually of light timber, such as deals, battens, scantlings, boards, and ends. In addition, the Baltic countries furnish large quantities of softwood pit props (used in coal mines), railroad ties and poles, also a small quantity of what is known as "roundwood."

The lumber brought from the Baltic countries to the United Kingdom is practically always cut to English measure, and the sizes are as follows: [7]

Deals.—2, 2½, 3, and 4 by 9 and 11 inches; very few 10 or 12 inches and wider ever being furnished.

Battens.—2, 2½, 3, and 4 by 6, 7, and 8 inches.

Scantings.—2, 2½, and 3 by 3, 3½, 4, 4½, 5, and 5½ inches.

Boards.—½, ⅝, ¾, 1, 1¼, 1½, and 1¾ by 3, 3½, 4, 4½, 5, 5½, 6, 6½, 7, 8, and 9 inches.

Ends.—All sizes, 6 to 8 feet long.

Short lengths.—All charters stipulate that ends, not exceeding 2 percent of the total shipment, must be furnished for stowage purposes and are carried at two-thirds of the rate for stock 9 feet and longer.

Long lengths.—The usual length for deals and battens is 9 feet and up in multiples of 1 foot, averaging 14 to 15 feet on shipments from Finland, Sweden, and Norway, although longer in certain districts. For the stock from the U. S. S. R., lengths are 12 feet and longer, averaging 18 to 19 feet.

A vessel will carry a good cargo, usually, only if the charter provides for a proper amount of short lengths and other small stock such as laths and pickets, for use as broken stowage, and stipulates that these be delivered alongside at the commencement of loading so that they can be fully utilized as the loading proceeds. Full stowage below decks makes possible the carriage of a larger deck load.

Shipping season.—Most of the ports in northern Europe from which lumber is exported are ice-bound from November to late April, although the period varies with their location and the early or late arrival of winter or spring and the success of the ice breakers, which are employed in some instances to keep them open. As a consequence of these conditions, most of the enormous volume of lumber exported from northern Europe must be shipped in about 7 months. The opening of the shipping season generally witnesses a rush of vessels to load in order that their cargoes may be among the earliest arrivals on a depleted market.

Toward the end of the season there is the same rush of vessels to load, as there is constant danger at the time of the ports' being

[7] The British Lumber Market; A. E. Boadle, American Trade Commissioner. United States Government Printing Office. 1928.

frozen before all shipments have been made, also on account of restriction of deck loads to 3 feet for vessels arriving at a United Kingdom port after October 31, thus necessitating the "overwintering" of stocks until first open water the following spring.

There are some exceptions, however, as some ports are not affected by ice and are open all the year round—notably those in Norway, all of the west and east coasts of Sweden, south of and including Stockholm, and one or two ports in the south of Finland. The lumber shipped from some of the districts in south Sweden is short, sappy, and coarse-grained, and for that reason it is principally sold when other stock cannot be obtained.

The White Sea Trade

Considerable quantities of softwood (pine and spruce), usually rough sawn, not dressed, are shipped from the White Sea ports of Archangel, Onega, Soroka, Kem, Kovda, Keret, and Mesane. Of these, Archangel is by far the most important. Vessels for the White Sea, having to pass around the North Cape and through the Arctic Ocean, are compelled to wait until the summer is well advanced for safe navigation, so that it is usually some time in June before the first of the season's loadings take place, and the end of November or occasionally early December sees the season's close.

The lengths of lumber shipped from the White Sea ports are exceptionally long compared with the lumber shipped from other north European countries and will average 18 to 19 feet, except in the first and second qualities, which will run a little less.

The North Pacific Trade

Lumber, logs, and other forest products constitute important items exported from the Pacific coast of the United States and Canada, and the carriage of these products to the various world markets requires a very large number of vessels each year. The bulk of the lumber shipped from the Pacific coast is Douglas fir, with a good proportion of hemlock, cedar, and spruce. Baby squares and flitches are extensively used as broken stowage.

Shipowners and operators and shipmasters engaged in the Pacific coast lumber trade, as well as stevedores and others concerned with the exporting or importing of Pacific coast lumber, logs or piling will find a great deal of valuable information in the "Lumber and Log Exporters' Guide" and the "Practical Lumberman, 6th Edition," both prepared and published by Bernard Brereton, Seattle, Washington, the originator of the Brereton log scale for determining log stowage factors. This scale is used extensively in the export log trade of the United States Pacific Coast and British Columbia, and was also adopted by the Japanese Government in 1929. The booklets referred to are available from Mr. Brereton. Portions of them, which apply particularly to the present work, are quoted below.

Advantages of One Port of Loading and Discharge

It should be the goal of every steamship operator to load each vessel in his service for one port of loading and one port of discharge.

There are numerous instances where this system could be followed, but it is not done, principally through the management of the steamship company

allowing the purchasing department to buy at haphazard, or in districts where lumber can be obtained at a few cents per thousand below the market rate so that the buying department can make a good showing; in other words, it does not pay to purchase cheap lumber outside the logical loading district, if it entails a loss in lifting it.

For example, it would not be policy to send a vessel of 4,000,000 board feet capacity to Grays Harbor to lift 1,000,000 board feet there and 3,000,000 feet on Puget Sound, simply because the lumber could be purchased for 25 cents per thousand cheaper on Grays Harbor than on Puget Sound. In this instance the buying department would make $250, but as the extra operating costs would be at least $1,000, it would mean a net loss to the company of $750.

Another source of loss is occasioned when steamship operators allocate two vessels, to load about the same time, for two ports of discharge, such as Sydney and Melbourne, when by a little forethought, they could load each vessel for a single port and thus save thousands of dollars. Incredible as it may seem, these blunders are of frequent occurrence and as they are the rule and not the exception it will pay those interested in the profitable operation of their vessels to take the necessary steps to guard against the costly errors described before binding contracts are consummated.

Short Stowage

In purchasing lumber for export cargo shipment, especially in the Japanese trade, care should be taken to see that sufficient short lengths for stowage are provided at each loading berth. For example, if arrangements are made to load 1,000,000 board feet at one berth of what is known as large and medium squares, which run from 12 by 12 inches to 24 by 24 inches, 20 to 40 feet in length, and no small sizes and short lengths are provided, the loss in freight revenue due to poor stowage would amount to thousands of dollars. When logs are to be loaded, the time and place of shipment should be mutually agreed upon between the buying and operating departments.

Buying and Freighting Long Lengths

Before buying lumber over 40 feet in length, the purchasing department should consult the operating department regarding the time of delivery and the extreme length and amount of long timbers that the vessel in question can carry, as the holds of some steamers are not long enough to stow many timbers over 40 feet long, and the amount that can be put on deck would be governed by the length of the deck and the height of the deckload.

In computing the under deck capacity of a vessel for long piling or timbers, it should be remembered that, as a rule, it is only safe to figure on being able to stow them amidships, as stanchions and ventilators often prevent them from being stowed in the wings. On deck it is the reverse, as long lengths can be stowed in the wings, but not always amidships, owing to the obstruction of masts, hatch coamings, and winches.

Stowage of Clear Lumber on Deck

In the Douglas fir region it is customary to stow clear Douglas fir lumber, either under or on deck, but when it is loaded on deck it should be protected from the elements or coming into contact with the bare deck. The customary method of stowing clears on deck is to put the merchantable or common grades first on a dunnaged deck and in the wing tiers, then the clears, which should be covered with lower grade lumber or a class of dunnage boards that can be disposed of to advantage at port of delivery.

As the area of the deck of an ordinary cargo steamer is about 10,000 square feet, it is apparent that an immense amount of clear lumber is liable to be damaged through checking and weather stain, if adequate precautions are not taken to protect it from damage.

Cause and Effect of Slack Oil Tanks

Many oil-burning vessels do not carry what they should on deck, because the double bottom tanks, which contain fuel oil for the voyage, are not full to capacity and no attempt is made to fill them; this can be done by transferring the oil

from one tank to another, or by taking the oil for use in port from one slack tank only. Failure to keep tanks full, that are not in use, gives the vessel a list, which increases as the height of the deckload increases. This prematurely stops the loading and if the list cannot be taken out, the vessel proceeds to sea without lifting the cargo it could have taken, had the tanks been efficiently handled.

Efficiency of Pacific Coast Stevedores

Responsible for Quick Dispatch and Good Stowage Factor

After the vessel starts to load, the supercargo should make it his business to see that the cargo is delivered to the stevedores in the best sizes and lengths to make good stowage. In this respect it can be said that the stevedores on the Pacific coast have earned an enviable reputation for excellent work, which is due to their untiring efforts in bringing their organizations up to the highest state of efficiency. Conclusive evidence is furnished of this by the way the stowage factor has been bettered in the last few years, also by quicker dispatch. In the past, if 1,000 board feet of export lumber was stowed in a factor of 120 cubic feet bale space at the average rate of 8,000 board feet per hour, per gang, it was considered good work. Today the stowage factor would be about 116 and the average rate of loading per gang, per hour, about 11,000 board feet.

The stowage factor means the number of cubic feet bale space to stow 1,000 board feet of lumber under deck. For example, the cubic feet bale space capacity of a certain compartment is 36,000 and the stowage factor 120, and you wish to know how many board feet of lumber the said compartment should hold. Divide the stowage factor of 120 into 36,000 (the cubic feet bale space) and the answer of 300 gives the board feet capacity in thousands.

Delivery of Cargo to Benefit Dispatch and Stowage

Delivery of the right kind of cargo, to the right hatch, at the right time, should be the aim of the supercargo. If the following principle is adopted it can easily be applied in a general way. Assemble long lumber for long compartments or on deck, short lumber for short compartments, big lumber for big compartments, and small lumber for small compartments. When it is feasible, heavy timbers should be stowed on the floor, preferably amidships, and the lighter lumber in the wings or for winging up. Delivery of the cargo so that it can be handled as described makes the work easier for the longshoremen, benefits stowage, and accelerates dispatch.

Stowage and Marking Off Orders

Orders containing 100,000 board feet or less, should be stowed intact if it is feasible. It is customary to split large orders and stow them in more than one compartment, unless instructed to the contrary, or to stow specified amounts together to suit the capacity of lighters or other conditions at the port of discharge.

As soon as a parcel has been loaded, it should be marked off with paint at intervals of 10 feet. It is advisable to change the color of the paint on small parcels, as it prevents confusion when the marks on different parcels run close together or are exposed during discharge. If conditions are suitable, it is a good idea to mark off each destination with the same color of paint. For example, Brisbane orders could be marked off with black paint, Newcastle with blue paint, and Sydney with red paint.

It is advisable to mark off clear surfaced lumber with rope yarn, as paint marks detract from the appearance of finished material. In shipments from the Douglas fir region to Atlantic ports of the United States, it is customary to use wire, fastened at intervals with staples, to mark off orders; but this system is not advocated for foreign export shipments, the objection being that the staples which may not have been withdrawn from the lumber at port of discharge damage the saws or planer knives during the course of re-manufacture in a foreign country.

A cargo stowed well, with orders intact and properly marked off, coupled with a clear and correct stowage plan, is appreciated by every one concerned, especially by the foreign agent and stevedore at the port of discharge, as it facilitates their work and reduces the discharging costs.

Rafted Lumber Damaged by Oil, Silt, or Barnacles

A number of suppliers of lumber raft their timbers for export shipment. This facilitates handling at the mill and saves literage charges. Provided the weather is not too rough, the stevedore can usually load rafted timbers as easily as if they were piled on a dock. This system benefits the steamship operators as the timbers can be delivered at any hatch designated, and the lengths can be sorted to suit stowage requirements.

Timbers should not be rafted for export shipment when there is danger of them being covered with oil that floats in the vicinity of creosote works, or that which is discharged from steamers when they are cleaning their bilges or fuel oil tanks. Oil blackens and clings to floating timbers and if the same are loaded in the hold or on deck of a steamer, the stevedores tramp over them and by so doing discolor other lumber that was not oil stained at time of loading.

It is the duty of the captain, supercargo, or agent for the steamship operators to refuse to accept for shipment oil stained lumber, on the grounds that it is not in good order and condition.

Deckloads

Estimating the approximate amount of lumber that a vessel should carry on deck has always been a difficult problem, even with experienced shipping men, but it can be done by using the following system provided the type and general particulars are known.

Single-deck type.—Should carry on deck about 30 percent of the amount of the cargo carried under deck; for instance, if the vessel carried 3,000,000 board feet of Douglas fir lumber under deck, it should carry 900,000 board feet on deck.

Two-deck type.—This class of vessel usually has a well deck forward and aft, each about 100 feet in length; it should carry on deck about 28 percent of the amount of the cargo carried under deck.

Single deck with shelter deck.—Should carry on deck about 20 percent of the amount of the cargo carried under deck.

Two decks with shelter deck.—This type carries a small deckload, owing to the fact that the shelter deck is usually about 7 feet above the deck line; in other words, if the deckload is 6 feet in height, it would be equivalent to 13 feet, or the height of the shelter deck and deckload combined. This class of vessel should carry on deck about 10 percent of the amount of the cargo carried under deck.

Deadweight.—In computing the carrying capacity of a vessel on deck, it must always be remembered that it cannot legitimately carry more than its deadweight at the summer or winter marks, depending on the time of year the vessel is loaded. For example, to find the approximate amount of Douglas fir lumber that a single deck motor vessel should carry on deck, with 750 tons fuel (Diesel) oil and loaded to its summer marks:

Summer deadweight	6,700 tons
Fuel oil capacity	835 tons
Peak tanks, water	113 tons
Bale capacity	330,000 cubic feet

Operation.—330,000 cubic feet bale space at a stowage factor of 110 equals 3,000,000 board feet, at 1.5 equals 4,500 tons; fuel oil, 750 tons; fresh water and stores (usual allowance), 100 tons; deadweight, under deck, 5,350 tons; deadweight, left for deckload, 1,350 tons; deadweight at summer marks, 6,700 tons.

Thirty percent of 3,000,000 board feet, under deck, equals 900,000 board feet, which is equivalent to 1,350 tons, the remainder of deadweight left for deckload.

Note.—1,000 board feet of Douglas fir lumber equals 1.5 deadweight tons (2,240 pounds equals 1 ton deadweight).

As the fuel-oil capacity of the vessel is 835 tons, and the amount of oil on departure is 750 tons, it leaves one small tank of 85 tons in reserve (empty); this tank can be filled with water ballast if necessary, to counteract tenderness due to a slack tank caused by withdrawing oil from it for fuel purposes.

It is a general rule that when either coal- or oil-burning vessels are loaded with a capacity deckload of lumber, to hold one or more small capacity tanks in reserve, so that they can be filled with ballast water at sea to offset any loss of stability that might be occasioned by using up the bunker coal or oil fuel during the voyage. It is preferable to hold small double bottom tanks in

reserve, for should the necessity arise to fill them at sea they would not cause the vessel to take a dangerous list such as might occur during the process of filling a large tank.

Light and Heavy Logs and Lumber

The importance of knowing how to compute the weight of logs is a vital necessity, since ignorance on this subject is often the cause of heavy financial losses to steamship operators who are anxious to get business and unwittingly freight hemlock and other heavy weight species of logs at the same rate of freight as red cedar logs. As an example, assume that a steamer has 2,010 deadweight tons (2,240 pounds per ton) available for cargo, what would the difference in freight revenue amount to at $16 per thousand board feet, Brereton scale, if the vessel was loaded to its deadweight capacity with Pacific hemlock logs instead of Western red cedar logs?

1,500,000 board feet Western red cedar logs at 3 pounds per board foot, Brereton scale, equals 2,010 deadweight tons.
979,000 board feet Pacific hemlock logs at 4.6 pounds per board foot, Brereton scale, equals 2,010 deadweight tons.
1,500,000 feet cedar logs at $16 per M, Brereton scale, equals $24,000.
979,000 feet hemlock logs at $16 per M, Brereton scale, equals $15,664.
521,000 feet difference, or freight revenue loss of $8,336.

To avert a loss as described in the foregoing, or to increase freight revenue, steamship operators who have steamers of different types available for carrying logs of various species, should when assigning a steamer to freight heavy weight logs, choose a vessel that does not usually go to its marks when bunkered and fully loaded with lumber.

The two deck and shelter deck steamer would be an ideal carrier for heavy weight logs and lumber, such as hemlock, as this type of vessel usually becomes too tender to load to its summer load line, unless it has a specially selected cargo of lumber and/or logs with weight of cargo so adjusted that it could finish loading on an even keel and in such a manner that its stability would not be endangered when loaded to its marks.

Freshly sawn hemlock or green redwood in large quantities when loaded in the lower holds greatly add to the stability of a vessel and it is the ideal cargo for a shelter deck steamer, provided that Douglas fir or lumber of lighter weight than hemlock is loaded in the upper holds and on deck, as the heavier weight of green hemlock or redwood lumber when loaded in the lower holds increases the stability of the vessel and enables it to carry a larger deckload than usual.

The Right and Wrong Type of Vessels for Carrying Logs

As the weight of lumber per board foot exceeds the weight of logs of the same species that can be stowed in an equal space, it proves that lumber should be stowed first and logs last in a vessel, as an aid to stability.

Those who contemplate shipping large quantities of logs should bear this in mind and avoid using the two-deck and shelter deck type of steamer or vessels with a narrow beam for freighting red cedar logs, as it is a well-known fact that vessels of the type mentioned usually become tender and list so much that loading must often be stopped when they are several inches from their marks, thus shutting out hundreds of tons of cargo with its consequent loss of freight revenue.

Steamship operators should whenever possible give preference to a well deck steamer with a wide beam for freighting logs, as this type is an ideal lumber and log carrier and can invariably be loaded to its marks with a straight lumber cargo, or a combination cargo of lumber and logs.

PART CARGOES

A great deal of lumber is carried nowadays in parcel lots and as "part" cargo, which is to be stowed with general cargo. Careful attention must be given to the stowage of such lumber to prevent its being damaged by other cargo, and also to prevent it, particularly if it is green, from injuring delicate cargo or foodstuffs.

Faulty stowage, resulting in damage to finished lumber, has arisen in the past through stowing casks of resin on top of the lumber and

through stowing lumber near or beneath leaky turpentine containers. Mahogany and other valuable woods, in the form of boards, have been seriously damaged because heavy cases have been stowed on top of them and, particularly during discharge, the boards have been marked, dented, and otherwise heavily damaged. Boards of this class should be stowed absolutely flat, placed by themselves, and not mixed with other cargo. Teakwood planks are sometimes shipped from Burma, and elsewhere, at a reduced freight for use as dunnage under rice. Such planks must be laid flat so that the ends are not "hung up," as the latter type of stowage would result in breakage and damage. Green or newly sawn lumber should never be stowed with flour or other delicate foodstuffs or cargo which it might injure by its odor and by heating and throwing off moisture.

LOG STOWAGE

(*By Bernard Brereton, Originator of the Brereton Log Scale*)

Based on the middle diameter and extreme measurement, meaning "outside the bark," logs require 25 percent more cargo stowage space than sawed export lumber, the standard stowage factor for which is 120 cubic feet bale space per thousand board feet.

Perplexing situation.—Now as it is customary for commercial purposes throughout the world to measure logs inside the bark, Brereton Scale included—and ship them by steamer with the bark on, which varies according to species and increases as the diameter increases—a very perplexing situation for estimating weights and stowage space arises on this account.

It therefore stands to reason that the employment of a single stowage factor for bark stuck logs as used in the past or up to the present is neither correct nor reliable, and its use is the result of frequent blunders in estimating the log carrying capacity of steamers.

Result of blunders.—If the carrying capacity of a steamer is overestimated part of the cargo will be shut out. This may result in cancelation of contracts, or reclamation claims through failure to fill orders as specified, also the cost of rehandling stowage and possibility of having to ship the rest of the cargo at an advanced rate of freight.

Should the cargo-carrying capacity be underestimated and the steamer sail short of cargo on this account, it would mean a loss in freight revenue that might result in very serious consequence, especially for those responsible for the blunder.

Information Necessary to Determine Stowage

In making stowage estimates it is absolutely necessary to know the approximate thickness of bark and average diameter of the logs in a shipment. These and other details can usually be obtained from the log supplier, scaler or by personal inspection.

Lengths.—Particulars regarding lengths are essential, as logs of one length make much better stowage than those of miscellaneous lengths. This specially refers to Western red cedar logs of 12 and 13 feet shipped in enormous quantities to Japan under normal conditions. These logs make very desirable cargo, owing to their uniform length, light weight, and easy handling.

Stowage Factors for Logs of One Length

For logs of one length only, such as Western red cedar, deduct 10 percent from the cargo stowage factors as given in the table for logs of various lengths.

Cargo Stowage Factor for Peeled Logs

The standard cargo stowage factor for peeled logs (without bark) of various lengths of any species or diameter is 150 cubic feet bale space per 1,000 board feet, Brereton Scale. For peeled logs of one length only deduct 10 percent from the factor for logs of various lengths. Thus, 150 minus 10 percent equals 135—the stowage factor.

Cargo Stowage Factors for Bark Stuck Logs

The stowage factor varies according to the thickness of the bark and changes virtually with each diameter. Under these circumstances intricate calculations can be avoided by making use of the table which gives the stowage factors for logs of all diameters and varying thicknesses of bark.

Cargo Stowage Factor for Export Lumber

Base calculations on 1,000 board feet of sawed export lumber stowing in the standard stowage factor of 120 cubic feet bale space.

Cargo Stowage Factors for Logs With Bark, Based on Brereton Scale Measurement Inside the Bark

[Figures opposite diameter indicate cubic feet bale space necessary to stow 1,000 board feet, Brereton scale logs of various lengths]

Diameter, Brereton scale	Stowage factors thickness of bark (inches)				Diameter, Brereton scale	Stowage factors thickness of bark (inches)			
	½	1	1½	2		½	1	1½	2
10	180	215	253	292	31	160	170	180	190
11	178	210	243	279	32	160	169	179	189
12	177	204	235	267	33	159	169	179	189
13	174	199	227	256	34	159	168	178	187
14	172	196	221	247	35	159	168	177	186
15	170	192	215	241	36	158	167	176	185
16	169	190	212	234	37	158	167	175	184
17	168	188	207	229	38	158	166	174	183
18	168	185	204	224	39	158	166	174	182
19	166	183	201	219	40	158	165	173	182
20	165	181	198	216	41	157	165	173	181
21	165	180	196	213	42	157	165	172	180
22	164	178	193	210	43	157	164	172	180
23	163	177	192	207	44	157	164	171	179
24	163	176	190	204	45	157	164	171	178
25	162	175	188	202	46	157	163	170	177
26	162	174	187	200	47	157	163	170	177
27	161	173	185	198	48	156	163	169	176
28	161	172	184	196	49	156	162	169	175
29	160	171	182	194	50	156	162	169	175
30	160	171	181	192	60	155	160	165	170

How to Use Cargo Stowage Factor Table

Suppose you wish to know the stowage factor for a shipment of bark stuck logs of various lengths: First ascertain the average diameter Brereton scale and thickness of bark, then turn to the table at the intersection of the columns indicating the diameter and thickness of bark and the required stowage factor will be found.

Example.—If the diameter of a shipment of bark stuck logs averages 26 inches Brereton scale and the bark 2 inches in thickness, the indicated stowage factor of 200 would be the cubic feet bale space required to stow 1,000 board feet of bark stuck logs.

To Find the Space Necessary to Stow a Shipment of Bark Stuck Logs

Rule.—To find the cubic feet bale space necessary to stow a shipment of bark stuck logs of various lengths, multiply the amount of the shipment per thousand board feet Brereton scale by the stowage factor indicated in the table for the average diameter and thickness of bark.

Example.—Find the cubic feet bale space necessary to stow 120,000 board feet Brereton scale of bark stuck Douglas fir logs, of various lengths, 26 inches in diameter, with bark 2 inches thick, stowing in a factor of 200 cubic feet bale space (see table).

Operation.—120, the board feet in thousands, multiplied by 200, the stowage factor, equals 24,000, the cubic feet bale space necessary to stow shipment.

One length.—For logs of one length, deduct 10 percent from the total bale space.

Cargo Stowage and Weight Factors per Thousand Board Feet

[For lumber shipped from British Columbia and United States Pacific Coast Ports to World Ports and Atlantic Coast Ports of Canada and the United States]

Item	Description	Weight in pounds per 1,000 board feet	Long ton weight factor	Bale cubic stowage factor	Number of cubic feet occupied by long ton
FOREIGN EXPORT TRADE BETWEEN PACIFIC COAST PORTS AND WORLD PORTS					
California redwood:					
Unseasoned (green) clears	Sawed	4,930	2.2	120	55
Seasoned clears	do	2,460	1.1	125	114
Door stock, seasoned "block stowage"	do	2,240	1.0	105	105
Railroad ties (sleepers)	do	3,360	1.5	102	68
Douglas fir:					
June to September loading	do	3,230	1.44	116	81
October to May loading	do	3,360	1.5	118	79
January to December loading, Japanese squares, 12 by 12 and larger.	do	3,360	1.5	125	83
January to December loading, railroad ties (sleepers).	do	3,360	1.5	102	68
Pacific hemlock:					
June to September loading	do	3,600	1.6	116	72
October to May loading	do	4,030	1.8	118	66
January to December loading, Japanese squares, 12 by 12 and larger.	do	4,480	2.0	125	62
Port Orford cedar:					
June to September loading	do	3,230	1.44	116	81
October to May loading	do	3,360	1.5	118	79
Sitka spruce:					
Airplane material, flitches and wide clears, partly seasoned.	do	2,500	1.12	125	112
Western red cedar:					
June to September loading	do	2,240	1.00	120	120
October to May loading	do	2,350	1.05	120	114
INTERCOASTAL TRADE BETWEEN PACIFIC COAST PORTS AND ATLANTIC COAST PORTS					
Douglas fir:					
June to September loading	do	3,230	1.44	110	76
October to May loading	do	3,360	1.5	112	75
June to September loading, net measure	Surfaced	3,130	1.4	106	76
October to May loading, net measure	do	3,230	1.44	108	75
Pacific hemlock:					
June to September loading	Sawed	3,600	1.6	110	69
October to May loading	do	4,030	1.8	112	62
June to September loading, net measure	Surfaced	3,230	1.44	106	74
October to May loading, net measure	do	3,800	1.7	108	64

EXPORT AND INTERCOASTAL LUMBER SHIPMENTS

Freight on Finished Sizes

In the Pacific coast intercoastal and export trade, freight on lumber is assessed on the extreme finished size. For example, a piece of 1 by 4 (sawed size) flooring finished to 3¼-inch face, with a ¼-inch tongue, would be called 3½ inches, the extreme width. This principle applies to all finished sizes in surfaced (dressed) lumber.

When making freight computations, decimal factors are used to convert the original sawed or nominal sizes to the finished or net size. In this connection a table showing the Standard Finished Sizes under the established grading rules of the West Coast Lumbermen's Association and the British Columbia Lumber and Shingle Manufacturers Association is issued at a small cost by the Pacific Lumber Inpection Bureau, Inc., White Building, Seattle, Wash.

To Find the Decimal Conversion Factor

Rule.—The decimal freight factor is found by dividing the original sawed or nominal size into the finished size.

Example.—Find the decimal conversion factor for sawed 2 by 4 lumber, finished to 1⅝ by 3⅝.

Operation.—1⅝ by 3⅝ equals 5.89063 divided by 8 (2 by 4 sawed size) equals 0.73633, the decimal conversion factor for freight purposes.

Note.—From the foregoing it will be observed that the freight on surfaced (dressed) lumber is determined by multiplying the board foot amount of the order based on the original sawed size, by the decimal factor of the finished (net) size.

For example, on an intercoastal or export shipment by steamer of 100,000 board feet of sawed 2 by 4 finished to 1⅝ by 3⅝, the freight charges would be assessed on 73,633 board feet.

Cargo Stowage of Piling and Spars

In the ordinary cargo steamer long piling or spars can only be stowed under deck in the midship section, for the reason that the stanchions placed near the four corners of the hatches prevent the passage of long lengths into the wings. In some instances the stanchions can be taken out and this obstacle against stowing in the wings removed. In this connection it is customary to replace the stanchions before loading is completed and care must be taken that the stowage of cargo does not interfere with this replacement.

When long lengths can only be stowed amidship, the stowage of lumber in the wings is seriously retarded, as landing loads on the uneven surface of the piling prevents the use of dollies to run the loads into the wings. Another serious consideration is the delivery of the lumber or other cargo for side stowage in the wings, for if it is not delivered promptly at the right time and place, poor stowage and delay in loading will inevitably result—which means a serious loss in freight revenue.

When piling or spars can only be stowed amidship, it is not safe to reckon on the steamer carrying more than 25 percent of the under deck capacity in piling or spars.

The stowage of long piling or spars on deck is the reverse to the hold, in this case they can only be stowed in the wings as the hatches and winches prevent stowage amidship.

Under these circumstances 60 percent of the amount of the deck cargo in piling or spars would be a fair estimate.

Stowage Factors for Piling and Spars

Peeled piling or spars.—The stowage factor for various lengths is 150 cubic feet bale space per thousand board feet, Brereton scale.

For even lengths the factor is 135. This is based on reducing the factor for various lengths by 10 percent.

Bark stuck piling or spars.—(Bark stuck means logs and piling with the bark on and "peeled" without bark.) To find the stowage factor for a shipment, it is necessary to know the average diameter Brereton scale and the thickness of bark. Lengths do not enter into this calculation.

Example.—Find the cubic foot bale space necessary to stow 100,000 board feet Brereton scale piling, 12 inches average diameter, with bark 1-inch average in thickness.

Rule.—Turn to the log stowage table and at the intersection of the columns indicating 12 inches in diameter and bark 1 inch in thickness, the stowage factor per thousand board Brereton scale of 204 is found. This factor or whatever it may be multiplied by the board foot amount of the order in thousands equals the cubic foot bale space necessary to stow the shipment.

Operation.—One hundred, the board foot amount in thousands, multiplied by 204, the stowage factor equals 20,400, the cubic foot bale space necessary to stow 100,000 board feet, Brereton scale, of piling 12 inches average diameter with bark 1 inch in thickness.

In making computations, the thickness of the bark is doubled and when added to the inside diameter, it equals the extreme diameter upon which the stowage factors are based. In this case 12 plus 2 equals 14, the extreme diameter.

Note the enormous difference between stowage factors of peeled and bark stuck piling and the effect it would have on freight revenue and cost of stevedoring at port of loading and discharge and the time which would be gained in loading peeled instead of bark stuck piling, spars or logs.

A SPECIAL METHOD OF STOWING AND DISCHARGING LUMBER

An interesting method of handling, stowing, and discharging lumber, described by Stern,[8] is reprinted here because the methods employed might be adopted by some other specially situated company with consequent reduction in costs. The company cited by Stern trades coastwise and uses the gantry-crane system for discharging lumber.

The high productivity of this company, however, is due not so much to the equipment as to the system used in stowing the lumber when loading the ship. The company loads and discharges its own lumber. When loading, the lumber is arranged into units of uniform size and especially designed iron hooks are placed around each unit before loading it into the ship. The iron hooks are left with the unit, so that in discharging the cargo the hold men merely attach the lifting chains of the crane to the iron hooks on the unit of lumber. This system eliminates the necessity of stowing the individual pieces of lumber when loading and of making up the sling loads when discharging.

The average output in discharging lumber by this system is shown to be 68,800 board feet per crane per hour, and 5,970 board feet per man per hour. The man-hour productivity of this system of discharging lumber is nearly three times as large as for the line with the highest man-hour productivity attained by using the ship's gear and by stowing the lumber by individual pieces. The principal obstacles to the utilization of the unit system for intercoastal lumber are due to the fact that in using the unit system a large percentage of the cargo space is wasted in the process of stowing the units. Also, the lumber when stowed in units is not so compact as when stowed by the piece and there is danger of the lumber shifting in stormy weather.

WEIGHTS OF VARIOUS WOODS

The following table gives the weight in pounds per cubic foot of a number of commercial woods; also in most instances the weight per 1,000 board feet. The figures for North American woods are taken from a table compiled by the United States Forest Products Laboratory and published in its "Wood Handbook,"[9] p. 46. The figures for other woods have been taken from various sources which are considered reliable.

Weights of Various Woods

[Pounds]

Species	Weight per cubic foot		Weight per 1,000 board feet (air dry; 12 percent moisture content)
	Green	Air dry (12 percent moisture content)	
Alder, red	46	28	2,330
Ash:			
Black	52	34	2,830
Commercial white	48	41	3,420
Oregon	46	38	3,160
Aspen	.3	26	2,170
Basswood	42	26	2,170
Beech	54	45	3,760
Birch	57	44	3,670
Paper	50	38	3,160
Butternut	46	27	2,250
Cedar:			
Alaska	30	31	2,580
Eastern red	37	33	2,750
Incense	45	----	----
Northern white	28	22	1,830
Port Orford	56	29	2,420
Southern white	26	23	1,920
Western red	27	23	1,920

[8] Cargo Handling and Longshore Labor Conditions. Boris Stern, Bureau of Labor Statistics, United States Department of Labor. Government Printing Office, 1932; p. 58.

[9] Government Printing Office, September 1935.

Weights of Various Woods—Continued

[Pounds]

Species	Weight per cubic foot: Green	Weight per cubic foot: Air dry (12 percent moisture content)	Weight per 1,000 board feet (air dry; 12 percent moisture content)
Cherry, black	45	35	2,930
Chestnut	55	30	2,500
Cork	----	15	----
Cottonwood:			
Eastern	49	28	2,330
Northern black	46	24	2,000
Cypress, southern	51	32	2,670
Douglas fir.:			
Coast region	38	34	2,830
"Inland Empire" region	36	31	2,580
Rocky Mountain region	35	30	2,500
Elm:			
American	54	35	2,920
Rock	53	44	3,670
Slippery	56	37	3,080
Fir:			
Balsam	45	25	2,080
Commercial white	46	27	2,250
Gum:			
Black	45	35	2,920
Red	50	34	2,830
Tupelo	56	35	2,920
Hackberry	50	37	3,080
Hemlock:			
Eastern	50	28	2,330
Western	41	29	2,420
Hickory:			
Pecan	62	45	3,750
True	63	51	4,250
Honeylocust	61	----	----
Ironwood	----	71	----
Jarrah	----	52/55	----
Kauri	----	36	----
Larch, western	48	36	3,000
Lignum vitae	----	83	----
Lime	----	35	----
Locust, black	58	48	4,000
Magnolia:			
Cucumber	49	33	2,750
Evergreen	59	35	2,920
Mahogany:			
Honduras	----	35	----
Spanish	----	53	----
Maple:			
Bigleaf	47	34	2,830
Black	54	40	3,330
Red	50	38	3,170
Silver	45	33	2,750
Sugar	56	44	3,670
Oak:			
Red	64	44	3,670
White	63	47	3,920
Pine:			
Lodgepole	39	29	2,420
Northern white	36	25	2,080
Norway	42	34	2,830
Ponderosa	45	28	2,330
Southern yellow:			
Loblolly	53	36	3,000
Longleaf	55	41	3,420
Shortleaf	52	36	3,000
Sugar	52	25	2,080
Western white	35	27	2,250
Poplar, yellow	38	28	2,330
Redwood	50	28	2,330
Spruce:			
Eastern	34	28	2,330
Engelmann	39	23	1,920
Sitka	33	28	2,330
Sugarberry	48	36	3,000
Sycamore	52	34	2,830
Tamarack	47	37	3,080
Teak:			
African	----	60	----
Burma	----	54	----
Indian	----	46	----
Walnut, black	58	38	3,170

TIMBER DECKLOADS

Section 61 of the British Merchant Shipping Act, 1932

1. (2) In these Regulations unless the context otherwise requires:

The term "Load Line Rules" means the Rules for the time being in force made by the Board of Trade under Sections 42, 47, 48, and 68 of the Merchant Shipping (Safety and Load Line Conventions) Act, 1932.

The term "timber deck cargo" means a cargo of timber carried on an uncovered part of a freeboard or superstructure deck, but does not include a cargo of wood pulp or similar substance.

The term "freeboard deck" has the same meaning as in the Load Line Rules.

The term "superstructure deck" means the deck forming the top of a superstructure as defined in the Load Line Rules.

The term "timber load line" means a special load line to be used only when a ship carrying a timber deck cargo complies with these Regulations and the Load Line Rules.

3. *Application.*—Regulations 4 to 9 apply to all ships carrying a timber deck cargo.

4. *Deck openings covered by timber deck cargo.*—Openings to spaces below the freeboard deck shall be securely closed and battened down. All fittings such as hatchways beams, fore-and-afters and covers shall be in place. Where hold ventilation is needed, the ventilators shall be efficiently protected.

5. *Stowage.*—(a) The timber deck cargo shall be compactly stowed, lashed and secured. It must not interfere in any way with the navigation and necessary work of the ship, or with the provision of a safe margin of stability at all stages of the voyage, regard being given to additions of weight such as those due to absorption of water, and to losses of weight such as those due to consumption of fuel and stores.

(b) In the case of a ship without any of the areas set out in the Schedule which will be found at the end of this section, during the periods listed for each of these areas, the height of the timber deck cargo above the freeboard deck shall not exceed one-third of the extreme breadth of the ship.

6. *Protection of crew, access to machinery space, etc.*—Safe and satisfactory access to the quarters of the crew, to the machinery space and to all other parts used in the necessary work of the ship shall be available at all times. Deck cargo in way of openings which give access to such parts shall be so stowed that the openings can be properly closed and secured against the admission of water. Efficient protection for the crew in the form of guard rails or life lines, spaced not more than 12 inches apart vertically, shall be provided on each side of the timber deck cargo to a height of at least 4 feet above the cargo. The timber deck cargo shall be so stowed as to be sufficiently level for gangway purposes.

7. *Steering arrangements.*—Steering arrangements shall be effectively protected from damage by cargo, and, as far as practicable, shall be accessible. Efficient provision shall be made for steering in the event of a breakdown in the main steering arrangements.

8. *Lashings.*—A complete system of overall lashings of ample strength and in good condition, fitted with releasing arrangements, shall be provided so as to give effective security throughout the length of the timber deck cargo. The releasing arrangements shall be accessible at all times. All fittings required for securing lashings shall be of strength corresponding to the strength of the lashings.

9. *Uprights.*—When uprights are required by the nature of the timber, (a) the uprights shall be of adequate strength and may be of wood or metal; (b) the spacing shall be suitable for the length and character of timber carried, but shall not exceed 10 feet; and (c) efficient means shall be provided for securing the uprights.

10. *Application.*—The following additional regulations apply to steamers marked with timber-load lines when loaded beyond the maximum depth to which they would, for the time being, be entitled under the Load Line Rules to be loaded if they were not marked with timber-load lines.

11. *Stowage.*—The wells on the freeboard deck shall be filled with timber stowed as solidly as possible, to a height of at least (i) 6 feet for ships up to and including 250 feet in length, (ii) 7 feet 6 inches for ships 400 feet in length and above, and (iii) a proportionate intermediate height for ships above 250 feet but less than 400 feet.

12. *Lashings.*—The timber under-deck cargo shall be efficiently secured throughout its length by independent over-all lashings spaced not more than 10 feet apart. Over-all lashings shall be in good condition and shall consist of close link chain of not less than ¾ inch, or flexible wire rope of equivalent strength, fitted with slip hooks and stretching screws, which shall be accessible at all times. Wire rope lashings shall have a short length of long link chain to permit the length of lashings to be regulated.

When the timber is in lengths of less than 12 feet, the spacing of the lashings shall be reduced to suit the length of timber, or other suitable provision made.

When the spacing of the lashings is 5 feet or less, the size of the lashings may be reduced, but not less than ½-inch chain or equivalent wire rope shall be used.

13. *Means for securing uprights.*—For the purpose of securing uprights when these are required by the nature of the cargo, strong angles or metal sockets efficiently secured to the stringer plate, or equally efficient means, shall be provided.

On superstructure decks, uprights, where fitted, shall be secured by athwartship lashings of ample strength.

Schedule.—Following are the winter periods for 6 areas, as described:

(1) 16th October to 15th April. The area within and to the northwards of the following line: A line drawn south from the coast of Greenland at long. 50° W. to lat. 45° N., thence along the parallel of 45° N. to long. 15° W. thence north to lat. 60° N. thence along parallel of 60° N. to the west coast of Norway. Bergen is considered as being on the boundary between this area and area 2 below.

(2) 1st November to 31st March. The area north of a line drawn from the east coast of America along the parallel of 36° N. to Tarifa in Spain, excluding area 1 above but including the Baltic Sea.

(3) 16th December to 15th March. The Mediterranean and the Black Seas.

(4) 1st December to 28/29th February. The Sea of Japan between the parallels of 35° N. and 50° N.

(5) 16th October to 15th April. The area north of a line drawn from the east coast of Honshiu in Japan along the parallel of 35° N. to long. 150° W. and thence along a rhumb line to the west coast of Vancouver Island at lat. 50° N., but excluding area 4 above.

(6) 16th April to 15th October. The area south of a line drawn from the east coast of South America along the parallel of 40° S. to long. 56° W. thence along a rhumb line to the point lat. 34° S., long. 50° W. thence along the parallel of 34° S. to the west coast of South Africa from the east coast of South Africa at lat. 30° S. along a rhumb line to the west coast of Australia at lat. 35° S. thence along the south coast of Australia to Cape Arid thence along a rhumb line to Cape Grim, Tasmania, thence along the north coast of Tasmania to Eddystone Point thence along a rhumb line to the west coast of South Island, New Zealand, at long. 170° E. thence along the west, south, and east coasts of South Island to Cape Saunders, thence along a rhumb line to the point lat. 33° S. long. 170° W., and thence along the parallel of 33° S. to the west coast of South America.

ORES

Large quantities of different kinds of ores are carried in oversea trade, both in full-cargo lots and in smaller parcels, frequently bagged, carried as part of a general cargo. The ore trade is a worldwide one, some of the principal loading ports and the ores shipped including: manganese ore from Rio de Janeiro, Brazil; Vizagapatam, India; Mormugao, Portuguese India; Durban, South Africa; Takoradi, Gold Coast; and Casablanca, Morocco; chrome ore from Noumea, New Caledonia; Beira, and Lourenco Marques, Portuguese East Africa, and the Philippine Islands; pyrites from Huelva and Setubal, Spain, and Casablanca, Morocco; aluminum ore or bauxite from Dutch Guiana and Dubrovnik, Yugoslavia; and ilmenite ore from Colachel, India. Other ore-loading ports include Walvis Bay, South-West Africa; Koilthottam, India; Morphou Bay, Cyprus; Salonica,

Greece; Spalato, Yugoslavia; Bilbao and San Juan, Spain; Benisaf, and Bona, Algeria; Melilla, Morocco; Port Pirie, South Australia; Freetown, Sierra Leone; Mersin, Turkey; Cruz Grande, Chile; Poti, Soviet Union; and Wabana, Newfoundland. From these ports the various ores are carried to the principal iron and steel and other manufacturing centers of the United States, the United Kingdom, and continental Europe.

The carriage of ore in bulk as a full cargo requires special consideration with regard to the stability and trim of the vessel and the longitudinal distribution of the weight. In two or three-decked vessels, a part of a full cargo of ore should be placed in the 'tween decks to increase stability and make the vessel ride easier in a seaway. The ore should be trimmed out to the wings and to the bulkheads at each end of the compartment to distribute the weight and avoid the possibility of setting down the deck, which would exist if the ore were all to be left in the square of the hatch.

Longitudinally, a full ore cargo should be distributed between the middle and end compartments, the major portion of the cargo going

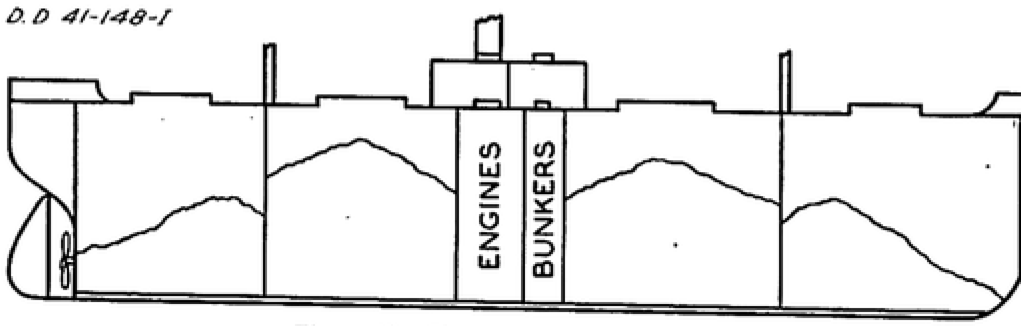

Figure 67.—Stowage of bulk ore cargo.

in the middle holds, and a somewhat smaller portion in the end holds. The ore in the forward hold should be piled against the after bulkhead, while that in the after hold should be piled against the forward bulkhead (fig. 67).

When loading, no single hold should receive all the ore intended for it while the other holds are empty. The loading should proceed so that all the holds are loaded fairly evenly in order to avoid undue strains to the vessel's structure. Many vessels have been permanently damaged through having ore loaded unevenly—one hold being filled while the others were empty—one recorded case involving a 300-foot steamer whose length was shortened practically 1 foot owing to this type of loading.

Ores loaded as part of a general cargo have frequently caused damage, either by reason of their giving off moisture or dust. When grain, oilseeds, or other dry cargo liable to damage from moisture must be stowed on top of ore, the ore should be overlaid with planks or, when loading in Far Eastern ports, bamboo laid sufficiently close and crossed so the bags of grain or other cargo cannot rest directly on the ore. Matting or burlap should then be laid over the planks or bamboo. Do not stow oils or acids on or over ores. Dust damage may arise when some ores are loaded during the dry season, and to prevent such damage the ores should be well covered over.

ORE CONCENTRATES

The regulations of the Board of Underwriters of New York for stowing ore concentrates are given below:

Ore concentrates containing sulfides in bags or in bulk are liable to spontaneous combustion and should not be stowed in a hold or deck with any other cargo liable to damage.

Some types of concentrates contain a large percentage of moisture and when shipped in bulk are liable to shift, in which case heavy shifting boards should be erected, and the bilge suction should be kept free.

PETROLEUM PRODUCTS

The great bulk of the world's oversea trade in crude petroleum and its principal refined products such as gasoline, kerosene, and fuel oil is carried in specially constructed tank vessels. These cargoes represent a highly specialized form of transportation and do not come within the province of the present volume. Transportation in bulk of these commodities is governed by the "General Rules and Regulations" prescribed by the Board of Supervising Inspectors, United States Department of Commerce, Bureau of Marine Inspection and Navigation. Individual companies in these trades have their own methods and their own vessels especially adapted to their own requirements, the types of petroleum products principally carried, and the ports of loading and discharge.

Various oils and other petroleum products in barrels, drums, and other packages, are carried by general cargo vessels, however, and in most instances require special attention in stowage, owing to their inflammable or other dangerous characteristics. The principal products shipped in this way are lubricating oils and greases, gasoline, naphtha, and kerosene, and the principal containers used are metal drums, wooden barrels, and nailed wooden boxes with inside metal containers. Lubricating oil is sometimes shipped in metal containers packed in fiberboard cartons.

BARRELED OILS

Barrels of lubricating oil are frequently carried as part of a general cargo and, in such case, should be given ordinary barrel stowage for liquids. Special care should be taken in the choice of the cargo space for stowage, however, with reference to the other commodities contained in the general cargo. Oil is a source of danger to other cargo, either from leakage or from its odor, and consequently should not be stowed among other goods which might be damaged by either of these causes. Ordinarily, barreled oil should not be stowed in the 'tween decks or upper decks in a general cargo, but by itself in one of the lower holds. If it is found necessary to stow barrels in the 'tween decks, the scuppers should be carefully inspected to make sure that they are clear so any leakage can run directly to the bilges. If there is grain in the lower holds, barreled oil must not be stowed above it, since leakage from the oil might get into the bilges beneath the grain and damage it seriously by taint.

See the regulations of the Board of Underwriters of New York, given below, which deal with the loading and stowage of lubricating oils.

CASE OIL

Case oil is the term applied to cargo consisting of various kinds of petroleum products—chiefly gasoline, kerosene, and benzine—which are commonly shipped in metal containers packed in wooden boxes or cases. For the stowage of case oil the holds must be thoroughly cleaned. Only clean dunnage should be used and this must be on hand in sufficient quantity as case oil requires more dunnage than the average type of general cargo. Leaky cases should not be accepted for shipment.

In stowing case oil, every effort must be made to keep the tiers perfectly level. When the bottom tier is being laid, for example, the cases must not be carried out to the turn of the bilge where they would rest at an angle. Such stowage would place additional pressure on one corner of the case and almost certainly damage it, and it is possible that it might "break" the whole stowage in the hold. The tiers should be started amidships, or in the after holds alongside the shaft tunnel, and worked out toward the wings. The spaces near the wings not filled with cases should be filled in with dunnage, and the next tier carried out over this, still keeping the line of the cases perfectly level. It is customary to floor over the first tier, and in deep holds to floor again at intermediate tiers.

Cases of the volatile oils must not be stowed on their sides as "flatters." Case oil should be very thoroughly blocked off with dunnage, since otherwise even a slight movement of the stowage may cause chafage and leakage.

The loading of case oil in the United States is regulated primarily by the rules of the United States Department of Commerce, Bureau of Marine Inspection and Navigation, to which the reader is referred for detailed information concerning stowage and other requirements. These regulations are contained in the publication "Explosives or Other Dangerous Articles on Board Vessels," which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. The cost of this publication is $1.

The rules of the Board of Underwriters of New York also influence the loading and stowage of case oil. Regulations of the Board dealing with the loading and stowage of various important petroleum products are given below. Nothing in the regulations of the United States Department of Commerce, Bureau of Marine Inspection and Navigation, should be construed as preventing the enforcement of reasonable local regulations, such as those of the Board of Underwriters of New York, when such regulations are not inconsistent or in conflict with the provisions of the United States Department of Commerce regulations.

REGULATIONS OF THE BOARD OF UNDERWRITERS OF NEW YORK

PETROLEUM OR ITS PRODUCTS IN CASES

1. *Steamships.*—All compartments where it is intended to stow cases must be thoroughly cleaned. All cargo battens to be in place. Where same are missing a 1-inch board can be used instead.

2. Steamers with bare tank tops but with platform laid in square of hatch are required to make up tank top to platform in square of hatch and to cross board over the making up.

3. Steamers with skin laid all over tank tops are required to stow on a 1-inch cross board.

4. Wings are to be made up solidly with planks or cord wood and boarded over top; also boarded fore and aft on side to prevent cases being damaged by pressure of the cord wood.

5. All cargo to be stowed in straight tiers fore and aft of vessel and in no case is it permitted to stow with the sheer of the vessel.

6. First tier on all occasions is to be cross-boarded from wing to wing before second tier is stowed over same. The after holds of steamers to be cross-boarded over first tier, also cross-boarded over the tier that comes level with top of shaft tunnel. The tops of shaft tunnels to be made up solid to take the strain of cross-boarding, thus making the level across the vessel. All breakages are to be secure with suitable dunnage wood. Split wood to be used in checking cases on tiering height both lower hold and 'tween decks.

7. All cases to be stowed on the edge except in beam-filling where one flatter of refined oil is allowed. Gasoline, naphtha, and benzine to be stowed on the edge in all cases, no flatter allowed between the beams.

8. All 'tween-deck compartments should be dunnaged 1 inch.

9. *Heavy oil.*—All oil in cases, such as lubricating, fuel, and gas oil not permitted under any circumstances to be stowed over cases of refined oil but are to be stowed under refined oil or in blocks by themselves.

10. All 'tween-deck hatch covers to be on and in place.

11. Gasoline, naphtha, and/or benzine must not be stowed in a compartment or hold forward of the stoke-hold or boiler-room, unless the bulkhead separating the stoke-hold or boiler-room from such compartment is of steel, watertight, and with a separate bilge and suction to such hold, and then only when approved general cargo such as machinery, automobiles, or oil in cases is stowed 20 feet on the forward part of such steel bulkhead.

12. If a wooden bulkhead is erected in this compartment or hold, and coal is carried between the wooden bulkhead and the stoke-hold or boiler-room bulkhead it will not be permissible to stow gasoline, naphtha, and/or benzine in this hold or compartment.

13. Gasoline, naphtha, and/or benzine must not be stowed nearer the engine room bulkhead than ten (10) feet whether in the deep tank, 'tween decks, or hold.

14. All compartments in which gasoline, naphtha, and/or benzine are stowed must be properly ventilated to the satisfaction of the surveyor. All ventilators must be covered with wire gauze and trimmed during loading. If possible, a wind-sail should be used while cargo is being loaded.

15. Gasoline, naphtha, and/or benzine must not be stowed with the ordinary general cargo.

LUBRICATING OIL, TURPENTINE, AND KEROSENE IN BARRELS

1. All barrels must be stowed bung up, and bilge free, care being taken that the chimes are kept free from the sides of the vessel in the ends.

2. No barrel is to be stowed in a place where there is not sufficient room without bearing its weight on the bilge.

3. All barrels must be stowed in straight tiers fore and aft. In no case will it be permitted to stow with the sheer of the vessel (rounded off) on the sides.

4. The middle of the barrel must be stowed over the four heads of the barrels in the under tier. This will bring the head of each barrel to the bunghole of the under barrel.

5. In places where a barrel cannot be stowed in accordance with the above, wood or suitable dunnage should be fitted in carefully, in order to secure the barrels in the tier.

6. Barrels must not be stowed within 20 feet of a steamer's fiddley or in any compartment liable to heat.

CARRYING OF GASOLINE, NAPHTHA, AND BENZINE IN 18-GAGE 55-GALLON STEEL DRUMS

Gasoline, naphtha, and benzine may be carried in 18-gage 55-gallon steel drums providing the drums are new and direct from the oil works or factory.

The drums must not be stowed more than seven high on end and if the full quantity in height is not required there must not be stowed on top of the drums any cargo whose weight would exceed that of the drums and contents.

The drums must be well dunnaged between each tier and any broken wing stowage must be filled in with dunnage to equalize the pressure on the lower tiers and make a level.

No drums containing any of the liquids covered by this rule are to be used as fillers between the beams under the deck head.

The drums may be either straight-sided or corrugated, sometimes called rolled-in-hoops.

GASOLINE CARGO IN HOLDS ADJACENT TO THE BOILER IN THE MOTOR ROOM OF A MOTOR VESSEL

Where a motor vessel intends to load gasoline in the hold adjacent to the boiler in the motor room, the surveyor shall inspect such boiler and if it is insulated or lagged, gasoline cargoes may be carried in that hold.

If the boiler is less than 5 feet from the bulkhead and is not insulated or lagged and is being operated, then the steel bulkhead on the boiler side shall be insulated by 2- by 4-inch uprights overlapped with tongue and grooved boards, and covered with sheet asbestos to the height of the boiler and extending 5 feet each side of same.

CARRYING OF INFLAMMABLE LIQUIDS IN I. C. C. DRUMS–5E

Any inflammable liquid with a flash point between 20° and 80° F. may be carried in the I. C. C. 5E drum (55-gallon capacity) provided the drums are new.

The drums must not be stowed more than 6 high on end. If the full quantity in height is not required, no cargo must be stowed on top of the drums whose weight would exceed that of the drums and contents.

The drums must be well dunnaged between each tier and any broken wing stowage must be filled in with dunnage to equalize the pressure on the lower tiers and make a level.

No drums with inflammable liquid are to be used as fillers between the beams under the deck head.

FULL CARGOES OF GASOLINE, NAPHTHA, AND BENZINE IN PACKAGES

Rules Applying Where a Temporary Bulkhead Is Constructed

1. A coal or oil-burning steamer, carrying a full cargo of gasoline, etc., or having the hold adjacent to the fire room or engine room full of these commodities, or not carrying in said hold sufficient suitable cargo to comply with the Board's rules, dated February 4, 1926 (see above, "Petroleum or Its Products in Cases") shall have a wooden bulkhead erected in such hold not less than three feet (3 feet) from either the boiler room or engine room iron bulkheads.

2. Each wooden bulkhead shall have ordinary paper of a thickness satisfactory to the Board's surveyor pasted on the cargo side of the bulkhead. Between the fire room and engine room bulkhead and the temporary bulkhead, there shall be across the vessel's hold sand to the height of 6 feet.

3. Tongued and grooved 1-inch boards with stiffeners shall be used in the construction of the wooden bulkhead, and gasoline, etc., may then be stowed against this temporary wooden bulkhead. No space shall be left between cargo and such bulkhead.

Rules Applying Where a Permanent Bulkhead Is Constructed

1–A. If a permanent bulkhead is constructed in lieu of the temporary bulkhead the vessel shall have on the fore part of the boiler room or stokehold, this includes 'tween decks if any, two 1-inch or a 2-inch wooden bulkhead built 6 inches from the iron bulkhead and between these bulkheads the space shall be filled with bulk asbestos or silicate of cotton packed to the satisfaction of the Board's surveyor.

2–A. A vessel having iron stiffeners extending into the cargo hold shall have boards 6 feet up from the tank top, these boards to be outside of such iron stiffeners. The upper section of this wooden blulkhead shall be 6 inches away from the iron bulkhead, the upper and lower sections are to be filled with asbestos or silicate of cotton. Any board, wooden braces, or wooden stiffeners resting on the iron bulkhead, or stiffeners shall have insulation of sheet asbestos separating iron and wood.

3-A. The engine room bulkhead in lower hold and 'tween decks (if any) shall have a wooden bulkhead constructed of two 1-inch boards or of 2-inch boards in the lower hold and decks 3 inches from the engine room bulkhead, this space to be filled with asbestos or silicate of cotton packed to the satisfaction of the Board's surveyor. The 'tween-decks bulkhead must be a continuous iron bulkhead from the lower hold to the upper decks to comply with this rule. Any board, wooden braces, or wooden stiffeners resting on the iron bulkhead, or stiffeners shall have insulation of sheet asbestos separating iron and wood.

No gasoline, naphtha, or benzine is to be carried in the 'tween decks over the engine room and boiler room, and none stowed less than 20 feet from the iron bulkhead of the fiddley in the forward end of the 'tween decks.

No coal is to be carried in the 'tween decks on the same level with gasoline, etc., unless an iron bulkhead intervenes.

All compartments to have as much ventilation as possible, cowl heads to be on and covered with a fine wire gauze.

Instruction No. 129 (October 10, 1940)

Referring to the rules printed immediately above, the Board states in this instruction that: "To clarify any doubt that may exist regarding the necessary protection of Bridge or Shelter Deck types of steam vessels, we recommend the following":

(a) *Coal-Burning Steamers.*—If bunker coal is carried in the bridge deck and/or shelter deck, the wooden bulkheads should be of good sound lumber, and the coal side of the bulkheads should be covered with sheet metal. One frame or beam forward or abaft these bulkheads, a tight tongued and grooved bulkhead of lumber not less than 1 inch thick, well supported, should be constructed and covered both sides with sheet asbestos and the space between these bulkheads should be filled with sand to a height of not less than 2½ feet. The tongued and grooved bulkheads must be away from the engine or boiler room casings and not over either of these spaces. If the bulkheads are widely spaced, sand to be placed against the tongued and grooved bulkhead to a height of 2 feet 6 inches.

(b) *Oil-Burning steamers.*—No gasoline, etc., shall be permitted alongside or adjacent to the engine or boiler room casings, or over either of these spaces. A tight 1-inch tongued and grooved wooden bulkhead, well supported, should be constructed forward and/or aft of these spaces covered both sides with sheet asbestos.

If possible, all bulkheads should be constructed so that the scuppers leading overside are on the gasoline side of such bulkheads.

Only suitable cargo of noncombustible nature may be carried in the open spaces, if desired.

(See also under "Cotton" regulations governing loading of gasoline, lubricating oil, and other petroleum products in vessels carrying cotton.)

RICE

The oversea rice trade is an important one which requires a large number of vessels each year. The principal shipping points are the Burmese ports, particularly Rangoon; Bangkok, Thailand; Saigon, French Indochina; and Calcutta and some other Indian ports. Rice is shipped in bags, sometimes in double bags, and is stowed like other cereals carried in bags, except that owing to the large percentage of water in rice and its consequent liability to sweat, special measures must be taken with regard to ventilation, which includes proper dunnaging and stowage. The cargo not only must be well ventilated, but also must be protected against the condensed moisture which may run down on it from deck beams, the ship's sides, and other parts of the holds.

Rice is also likely to be damaged by strong odors, and goods that have such odors should not be stowed in the same compartment.

Several different classes of rice are commonly shipped by the exporting countries. Paddy is rice without the husks removed, clean rice or rough rice is paddy after the husks have been removed, and white rice or polished rice is rice in its finished form. Cargo rice is a mixture of clean rice and paddy, approximately 80 percent of the former and 20 percent of the latter (more or less), the paddy being mixed in to prevent the contents of the bag lying too close together, thus providing for better circulation of air through the cargo.

Before loading a rice cargo the holds should be cleaned and thoroughly dried so that there is no water remaining in corners of stringers or other similar places. Floors should be well dunnaged, particularly at the turn of the bilge, and on stringers and other parts likely to collect condensed moisture. The floor and bilge dunnage should not be laid too close together, however, as spaces must be left to admit the circulation of air between the pieces of wood.

The usual method of side dunnaging employed with rice cargoes is to tie bamboo, or in some ports sticks, vertically to the horizontal wooden cargo battens. This not only prevents the rice bags from touching the metal surfaces of the cargo compartments, but also permits free circulation of air between the cargo and the skin of the ship.

All metal surfaces, such as beams, stringers, stanchions, and bulkheads, should be well covered with mats to prevent the bags from coming in contact with them. Soft rush or grass mats should never be used, and their employment is as a general rule prohibited. Instead, soft bamboo mats are used. All bamboo and bamboo mats taken aboard for dunnaging should be carefully inspected to make certain that they are dry. In many Far Eastern ports bamboos are rafted down to the ship and, while they may have been dried for several days by the sun, they may still contain large quantities of moisture.

To permit passage of air through the cargo, wooden ventilators composed of two boards joined together by connecting diagonal pieces are placed longitudinally and transversely the full length and width of the cargo compartments at regular intervals and at different levels. These form horizontal air ducts and are combined with vertical air shafts which lead upward through the cargo to the ship's ventilators. The purpose of this system of ventilation is to permit heated moisture given off by the rice to escape from the cargo holds.

For further information regarding ventilation of cargoes, such as rice, which are carried from tropic climates to the colder climates of Europe and the United States, the reader is referred to the chapter on "Damage from Temperature Changes During the Voyage."

REGULATIONS OF THE BOARD OF UNDERWRITERS OF NEW YORK

Stowage of Rice

1. These rules are particularly designed for full cargoes or full holds, of steamers passing from temperate into, or through, tropical zones, or vice versa.

2. As the principal danger is sweat due to overheating, the type of ventilation used should be the air duct system, the ducts to be open trellised lumber 8″ x 8″ square built and of sufficient strength to sustain considerable weight.

3. After the holds are cleaned, open dunnage is to be laid fore and aft on the skin of the hold, 5 inches high and spaced 1 foot apart with thwartship dunnage on top, well matted, to prevent leakage.

4. At every 5 feet up in stowage two air ducts to be laid thwartship in line with after and for'd hatch coamings, with two others laid fore and aft in line with hatch coamings, both lines to extend from wing to wing and bulkhead to bulkhead. Four perpendicular ducts to be carried up at the corner of each hatch coaming to the top deck.

5. Each thwartship, and fore and aft duct, to join up with the four perpendicular air ducts at coamings.

6. If general cargo is in 'tween decks each air duct in 'tween decks to be made a tight ventilator and continue up to the top of coamings. In normal weather the four corner hatches are to be kept open, but where practicable it is preferable to install a small ventilator at each corner.

7. Each hold is to have ventilators of usual requirements.

8. Bulkheads are to have perpendicular dunnage of at least 4 inches so as to allow a continuous draft of air throughout the cargo if the ventilators are properly attended to.

9. No beam fillings will be allowed.

10. No rice should be accepted when damp or wet.

SUGAR

Sugar is shipped from a number of regions, frequently in full-cargo lots, the principal exporting countries including Cuba, Puerto Rico, Hawaiian Islands, Java, Philippine Islands, Peru, India, Haiti, Mauritus, and India. In former years a great deal of sugar was shipped in hogsheads and baskets, and wet or green sugar, such as jaggery, was packed in mats. Nowadays, however, most of the sugar shipped overseas, whether raw, semirefined or refined, is packed in bags.

When carried in small consignments as part of a general cargo, sugar should be stowed well away from cargo which might damage it by taint, also from cargo which is liable to heat and throw off moisture, such as, for example, coconuts, which are frequently loaded at the same ports as sugar. Sugar is easily harmed by moisture and, whenever possible, loading it during wet or rainy weather should be avoided. Rum is another product frequently loaded at sugar ports, and it should never on any account be stowed on top of sugar because of danger of leakage and tainting. Rum may, however, be stowed in the same compartment with sugar, if the dunnaging is proper.

When a full cargo of sugar is to be carried, the holds and bilges should be thoroughly cleaned and all traces of oils, acids, or other odorous goods should be removed. All metal parts should be well matted over or otherwise dunnaged, since raw or semirefined sugar may give off moisture which will condense on metal parts and, if brought into contact with the bags, will moisten and melt the sugar, causing considerable loss.

Stowage of a full cargo of bagged sugar is the same as that required for other bagged cargo. Care must be taken not to allow bags to overlap stringer plates or other projecting metal parts, since there is a certain amount of "sinkage" during the voyage and as the cargo sinks, such bags will be cut or broken. This applies particularly to stowage of bags across the portable beams in the 'tween-deck hatches, since bags stowed across these beams are frequently cut completely in half. When stowing bags in this vicinity, the tiers should be brought up close underneath the beams, then the tiers laid fore and aft and between the beams, with the ends kept about 3 or 4 inches clear of the beams. The tiers should be carried up in this manner until about 1 foot higher than the portable beams and the

bags should then be laid over this space in a tier, so that when the cargo sinks, the bags will clear the hatch beams and not be damaged.

Special care must be taken in connection with ventilation when carrying sugar. Considerable condensation may take place with raw or semirefined sugar and every effort must be made to prevent this by observing the principles of ventilation described in the chapter on "Damage from Temperature Changes During the Voyage."

After discharging sugar, particularly green sugar, the holds and bilges should be washed out with salt water and then, if possible, with fresh water to insure proper drying. Sugar left on iron work may eat and corrode the metal, and sugar left in the bilges will give rise to strong odors.

It should be remembered that sugar can be ignited by sparks, etc., and that sugar fires are among the most difficult of all to extinguish. Usually, chemical extinguishers are required or it is necessary to flood the entire compartment. It should also be borne in mind that sugar which is fermenting, owing to heat on the voyage, gives off fumes which, on several occasions, have seriously gassed workers entering the holds to commence discharging the cargo.

REFRIGERATED CARGOES

The quantity and variety of perishable goods carried under refrigeration has increased to a very marked extent in recent years, owing in large measure to the construction of numerous ships fitted with refrigerated space and placed in regular service on the principal ocean routes. For a number of years frozen meat and other commodities have been carried in specially designed refrigerated ships from Australia and New Zealand to the United Kingdom and European Continent, and chilled meat has been brought from the River Plate to the same destinations. The trade in fresh fruits—apples, pears, grapes, oranges, lemons, and grapefruit—from the United States and Canadian Pacific coasts to the United Kingdom and other regions is also one that has been in existence for a considerable period. More recently the exportation of fresh fruits, such as nectarines, honeydew melons, peaches, grapes, cherries, and plums, from Chile to the United States and other destinations, has increased very rapidly; while at the same time the shipment of pears, plums, grapes, peaches, and nectarines from Argentina to the United States has become of real importance. Other products shipped under refrigeration from Argentina have also increased in quantity and include such diverse items as butter, casings, cheese, eggs, fish, crayfish, game, meat, glands, stearine,turkeys, vegetables, pork products, frozen dog meat, and cooked or frozen bull meat. Another trade that has reached considerable proportions is the carriage of fresh vegetables and fruits from Cuba to the United States, the principal products carried being tomatoes, lima beans, cucumbers, plantains, peppers, eggplants, okra, pineapples, grapefruit, and avocados.

Stowage and temperature requirements of the principal cargoes carried under refrigeration are discussed below.

STOWAGE AND TEMPERATURE REQUIREMENTS

Apples.—See Fresh fruit.
Avocadoes.—See Fresh fruit.

Bacon.—The temperature at which bacon is carried depends largely upon the cure. Very mild cures are usually carried at a temperature between 25° and 30° F.; the more hardy varieties between 33° and 38° F. Cases should be stowed fore and aft on athwartship battens, spaced to support the ends of the cases. Tiers should be interlayed with 1-inch battens; cases in upper tiers should be stowed fairly on cases in the tier below. Bacon should be given "wet stowage" because of its liability to give off drainage.

Beef, chilled.—As fore and hind quarters of chilled beef are hung from hooks attached to the deck above, no gratings or deck dunnage are necessary. In the 'tween decks in many ships only one height of beef is hung; but in other vessels hind quarters are customarily hung from the hooks attached to the overhead rails, and fore quarters are hung at a lower level by means of chains. In the lower holds of vessels where there is sufficient space, three or even more heights are hung by chains of varying lengths, forequarters usually being hung amidship and hindquarters more frequently in the wings.

The quarters should be packed close enough together to prevent excessive swinging when the vessel is rolling, but must not be hung so close together as to interfere with the necessary circulation of air. Usually, when the holds and 'tween decks have been filled to the square of the hatch, bars are laid across between the beams on which to hang the final quarters, thus providing good close stowage.

In all cases care must be taken to see that sufficient air space is left underneath the beef, and that the quarters are protected from any contact with the brine pipes. No chilled beef should be loaded when it is raining, since quarters wetted by rain are likely to develop mildew.

While chilled beef is usually carried at a temperature of 28½° to 29½° F., it is customary for the shipper to state in writing the temperature desired. The indicated temperature must then be rigidly adhered to, and should not vary more than half a degree in any part of the refrigerated compartments. For this reason, it is usually necessary to keep on hand supplies of warm brine, which are circulated through the pipes if there is danger of the temperature falling too low.

Beef, frozen.—Frozen beef is shipped in bulk in the hard, frozen condition at temperatures ranging from 12° to 15° F. The quarters are usually wrapped in hessian cloth.

Canvas slings should be used for loading frozen meat. Quarters should be examined for softness and mold. Meat showing signs of softness should be put to one side and later stowed on top directly under the overhead brine pipes. Moldy meat should not be accepted.

Battens of 3- by 3-inch material laid athwart on the ceiling at 9-inch centers are customarily used for frozen meat; also vertical battens of 2- by 2-inch or 3- by 3-inch material. Battens should be well frozen before cargo is loaded; otherwise the meat will become marked.

Quarters of beef are customarily stowed fore and aft on edge. If stowed flat, the air is prevented from circulating thoroughly. Fore and hind quarters do not stow well together, and are therefore usually stowed at different ends of a compartment.

Shanks should not be permitted to protrude between the brine pipes at ends and sides of the compartment. If this is permitted, the pressure of the shanks as they settle under the weight of the cargo above may strain the pipes.

Quarters should be stowed to as high as the stevedores can reach, working from each end of the compartment toward the square of the hatch. The quarters in way of the hatch opening should then be covered with a piece of clean canvas and a wooden platform should be laid over the canvas on which to land the remaining cargo, this process being repeated as necessary as the cargo mounts higher in the compartment. Walking boards should be laid for the stevedores to prevent damage to the meat already stowed.

If quarters of beef are overstowed with other cargo, 3- by 3-inch battens should be laid on top of the beef. In a compartment filled with frozen beef alone, the use of battens between tiers is not necessary, as the irregular shape of the quarters leaves sufficient space for air circulation.

Butter.—Butter, which is usually shipped in boxes or cases, may be stowed in the same compartment with frozen meat, without danger of tainting, but it will absorb taint from fruit and the two commodities should therefore never be stowed in the same compartment.

The boxes in which butter is shipped are usually made with outside battens on top and bottom. These keep the boxes apart and permit air to circulate between them. When plain boxes are used, each tier should be separated by

means of ½-inch battens. Before overstowing butter with any other cargo a tier of battens should always be laid on top of the boxes.

Butter is usually treated as hard-frozen cargo and is carried at 20° F. or lower; down to 10° F., if possible. Boxes should be stowed on battens so spaced as to take both ends of the case. The loading temperature should not exceed 30° F., and to avoid claims, butter which has melted prior to delivery to the ship should not be accepted.

Calf carcasses.—Calf carcasses covered in cloth are shipped in the hard-frozen condition. Stowage and temperature should be as for mutton.

Cheese.—Cheese is carried chiefly in wooden cases and crates, large quantities being exported from Argentina, Australia, and New Zealand, as well as from the Netherlands, Italy, and Switzerland. The temperature range at which it is commonly carried is from 35° to 40° F., although shippers at times request a higher temperature of about 50° F., and some lines carry cheese at 33° to 35° F.

Cheese containers should be stowed fore and aft on 3- by 3-inch athwartship battens, so arranged as to support the ends and center of the containers. At some ports it is customary to overlay the battens with boards laid fore and aft spaced so as to allow air circulation. Cases or crates should not be stowed higher than 12 or 13 feet, and Australian crates should not be stowed higher than 9 feet. No other cargo should be stowed over cheese.

When cheese is stowed near the brine pipes, it should be protected against injury from the low temperatures in that part of the compartment by means of vertical battens over which are nailed boards or hard mats. The latter should be arranged so as not to interfere with air circulation.

When cheese is carried in a compartment either immediately above or below a compartment containing low-temperature goods, it should be protected against the colder air penetrating its own compartment. This is usually done by covering the intervening deck and hatches with dry nonodorous sawdust to a depth of 4 to 5 inches, over which is laid a temporary wooden ceiling.

It should be remembered that, under certain conditions, cheese gives off poisonous fumes. When ready to discharge, these fumes should be cleared away before men are permitted to enter the compartment. Cheese is also liable to taint, and should not be stowed with other commodities that throw off odors.

Cherries.—See Fresh fruit.

Cucumbers.—See Vegetables, fresh.

Eggplants.—See Vegetables, fresh.

Eggs.—Eggs are packed in cases or crates, protected against breakage by means of compressed pulp trays molded to fit ends of eggs, wood shavings, fine straw, and other cushioning material. They should be stowed in a compartment by themselves, since they readily absorb taint from numerous other commodities such as fresh fruit, onions, newly sawn wood, and hay. For the same reason, eggs should not be stowed in a compartment which has an air-cooling system connected with another compartment containing strong-smelling goods.

Eggs should be handled carefully to avoid breakage, and the cases should be stowed fore and aft on the flat, never on edge, on battens spaced to take the heads and center partitions of the boxes or crates. Each tier should be interlaid with thin battens or 1-inch laths.

The usual temperature range for eggs is from 33° to 38° F. or from 35° to 40° F., although some shippers at times request a higher temperature of around 50° F. Eggs stowed near the brine pipes should be protected from injury caused by the low temperatures there by means of battens to which are nailed boards or hard mats. The latter should be arranged so they will not interfere with the air circulation.

If eggs are stowed in a compartment immediately above or below a compartment containing low-temperature cargo, such as frozen beef, precautions must be taken to prevent the cold air from the freezing compartment from penetrating the higher temperature compartment containing the eggs. Such penetration may not only reduce the temperature of the warmer compartment, but may also cause condensation of moisture on its metal surfaces. A commonly used practice is to cover the intervening deck and hatches with dry nonodorous sawdust to a depth of 4 to 5 inches, over which is laid a temporary wooden floor or ceiling.

Egg products.—A number of egg products are shipped from China in considerable quantities, all of which are hard-frozen and are usually carried at temperatures ranging from 10° to 15° F. These products include dried egg albumen, moist egg albumen, dried whole eggs, moist whole eggs (eggs broken in tins), dried egg yolk, and moist egg yolk. Tin-lined cases are generally

used for shipping dried egg albumen, dried whole eggs, and dried egg yolk; while the moist products are commonly packed in tins which are sometimes cased. These containers should all be stowed on 3- by 3-inch battens to take the ends of the containers, and each tier should be interlaid with 1-inch battens.

Fish, frozen.—Frozen fish packed in boxes is shipped in the hard-frozen condition and is usually carried at a temperature of 20° F. or lower, although some lines handle them at temperatures ranging from 18° to 26° F. This commodity should be stowed in a compartment by itself to avoid tainting other goods. It should be dunnaged and stowed in the same manner as bacon.

Fresh fruit.—(See detailed section on "Fresh fruits" at end of this chapter, p. 306.)

Grapefruit.—See Fresh fruit.

Grapes.—See Fresh fruit.

Lard.—Lard, under refrigeration, is usually carried at a temperature range of from 35° to 40° F., but is sometimes carried at 33° to 35° F. It is liable to taint and should not, therefore, be stowed in a compartment with other goods that throw off odors. Normally, lard is not shipped in refrigerated space, as too cold a temperature shortens its life. Many packers, consequently, prefer ordinary stowage, temperature between 50° and 60° F.

Lima beans.—See Vegetables, fresh.

Milk, fresh.—Is usually carried at a temperature range of 35° to 40° F., although some shippers at times request a higher temperature of about 50° F. Milk is subject to taint and should not, therefore, be stowed in a compartment with other goods that throw off odors.

Mutton and lamb.—Mutton and lamb carcasses are shipped in the hard-frozen condition from New Zealand, Australia, and Argentina, each carcass being wrapped in gauzelike material. The carrying temperature ranges from 12° to 15° F. Canvas slings should be used for loading.

Carcasses that are soft or show signs of mold should be rejected. Mold is likely to appear first on the throats and necks. The shanks of mutton and lamb carcasses in the hard-frozen condition are very brittle and break easily, so careful handling is required to prevent injury.

Battens of 3- by 3-inch material laid athwart on the ceiling at 9-inch centers are customarily used for frozen meat. Vertical battens of 2- by 2-inch or 3- by 3-inch material are placed over plain surfaces which are not piped over and over shaft-tunnel sides. These should be in line with the floor battens to permit the freest possible passage to warm air rising from the floor. It is important that the dunnage be well frozen before the lower tier of cargo is loaded; otherwise this tier will become marked.

Carcasses should be stowed fore and aft, and back to front, so that they fit together. They should not be allowed to contact the brine pipes or insulation and, at ends and sides of the compartment, care must be taken to prevent the shanks from protruding between brine pipes. If this is permitted, the pressure of the shanks as they settle under the weight of the cargo above may strain the pipes.

Loading on the floor of a hold must be carefully watched. Cases have occurred of a tier of lambs being stowed fore and aft against a bulkhead by stevedores unfamiliar with refrigerated ships, and a lamb laid athwart between the battens to keep the ends of the carcasses up level. If this stowage had not been noticed and corrected by ship's officers, serious damage would have occurred, owing to air circulation being impeded.

If mixed cargo of beef, mutton, lamb, and other frozen goods is being loaded, the mutton and lamb should be stowed in the 'tween-deck spaces because of their light weight, the heavier goods being stowed in the holds. Mutton stows at about 105 to 110 cubic feet to the ton, lamb at 120 to 125 cubic feet to the ton, and frozen beef at 90 to 95 cubic feet to the ton. Mutton and lamb may be stowed in the same compartment with beef and butter, but lamb, because of its liability to crushing, should not be overstowed with any other cargo. Furthermore, mutton should not be overstowed with any other cargo except lamb.

Carcasses should be stowed to as high as the stevedores can reach, working from each end of the compartment toward the square of the hatch. The carcasses in way of the hatch opening should then be covered with a piece of clean canvas and a wooden platform should be laid over the canvas on which to load the remaining cargo, this process being repeated as necessary, as the

cargo mounts higher in the compartment. Walking boards should be laid for the stevedores to prevent damage to the carcasses already stowed.

Nectarines.—See Fruit, fresh.

Offal.—Offal includes such animal products as casings, livers, oxtails, hearts, and kidneys. They are shipped in both bags and cases—casings usually in kegs, casks, or tierces. These products are usually carried in the hard-frozen condition at temperatures ranging from 10° to 18° F. Bagged offal, small pieces of beef, etc., have given rise to considerable trouble at various times, owing largely to the fact that the bags sag down between the battens and interfere with air circulation. To prevent this, it is advisable to use double battens, one line athwart and one fore and aft. The bags should then be laid in the opposite direction to the top line of battens.

It is customary—and to be recommended—to lay battens between every two tiers of bags to allow circulation of air throughout. These battens should be in the hold when the cooling takes place before starting to load, as otherwise they might damage the bags.

Bagged offal should be specially examined for hardness by sticking a pricker in the meat. Inspection should also be made for mold, and bags showing blood stains should be opened. All moldy goods, as well as those which are soft, should be rejected.

'Tween-deck stowage is recommended, as this class of goods does not carry well in deep stowage. Furthermore, it is not suitable for overstowage by other cargo. If overstowage is necessary, a tier of battens should be laid over the bagged goods.

Quarters of frozen beef and bags of beef offal are sometimes stowed in the same compartment. When this is done, the quarters are loaded on the ceiling to eliminate the need for double battens, and to save further space, tiers of quarters and bags may be stowed alternately.

Okra.—See Vegetables, fresh.

Pears.—See Fresh fruit.

Peaches.—See Fresh fruit.

Peppers.—See Vegetables, fresh.

Pineapples.—See Fresh fruit.

Plantains.—See Vegetables, fresh.

Plums.—See Fresh fruit.

Pork, frozen.—Frozen pig carcasses, or frozen pork, are shipped in the hard frozen condition in bulk. The carcasses are wrapped in a cotton material and are carried at a temperature range of 10° to 15° F.

Stowage should be the same as for mutton, which see. If necessary to stow lamb and mutton in the same compartment with pig carcesses, the latter, being heavier, should be stowed first to avoid crushing of the lamb or mutton.

Poultry.—Poultry is usually handled in the hard-frozen condition, packed in crates and is carried at a temperature of 20° F. or lower. Crates should be stowed fore and aft on battens, laid athwart and suitably spaced. Crates in tiers above to be stowed fairly on those in the tier below.

Rabbits.—Rabbits, shipped largely from Australia and New Zealand, are packed in the hard frozen condition in open crates, usually two dozen to the crate. The carrying temperature is 10° to 15° F. Crates should be stowed on battens, spaced so as to support the crates evenly. It is frequently recommended that 1-inch battens be laid between the tiers at every third tier.

Tomatoes.—See Vegetables, fresh.

Vegetables, fresh.—The principal trade in which American-flag vessels are employed in carrying fresh vegetables under refrigeration is that between Cuba and the United States. Lesser quantities of fresh vegetables are brought from Mexico and some of the Central and South American countries. Conditions governing in the Cuban trade are described below and indicate the usual practices observed in the carriage of fresh vegetables.

Tomatoes, lima beans, cucumbers, peppers, eggplants, and okra are the vegetables handled in largest volume in the Cuban trade, the principal shipping season lasting from about November 15 to April 1. All these vegetables are customarily carried under refrigeration with the occasional exception of tomatoes which, on account of the very large volume in which they are offered, on some occasions exceed the refrigerated space available and are then carried in ventilated compartments.

Tomatoes, as a rule, are shipped green, and, if in good condition when shipped, ordinarily outturn in good condition upon arrival, when shipped under ventila-

tion only. If tomatoes are showing color and are beginning to ripen when shipped, it has been the steamship companies' experience that they carry better under refrigeration. On green tomatoes the steamship companies endeavor to maintain a refrigerated temperature of between 50° and 55° F.

Lima beans, the second most important vegetable from the standpoint of volume carried in the Cuban trade, are invariably transported under refrigeration at a temperature approximating 40° to 45° F. Shipments of lima beans are accepted only after precooling. It has been the steamship companies' experience that precooled cargo may be stowed closely, allowing air lanes every few feet in the upper tiers, while non-precooled cargo should be stowed loosely or with dunnage so arranged as to facilitate the circulation of air between the packages. Every effort should be made, moreover, to keep precooled and non-precooled cargo stowed in separate compartments.

Okra is carried under the same conditions as are lima beans.

Peppers, eggplants, and cucumbers are customarily accorded refrigerated stowage, even though shipments are not always precooled. Temperature for these vegetables are maintained at between 40° and 45° F.

FRESH FRUITS

Much fresh fruit is carried without refrigeration on short voyages such as those from Spain, Palestine, and the Canary Islands to the United Kingdom or, in the case of some fruit such as apples, from the east coast of the United States to Europe. On the longer routes, however, such as those from the United States Pacific coast, New Zealand, Australia, Tasmania, and South Africa to the United Kingdom, and from the east and west coasts of South America to the United States and Europe, most fresh fruits can be carried satisfactorily only under refrigeration.

Fresh fruits are shipped in two conditions—precooled and non-precooled. With precooled fruit, which has been brought down to a relatively low temperature before being loaded, dunnage is usually needed chiefly for the purpose of bracing the boxes in place to prevent them from shifting with the motion of the vessel. With fruit that has not been precooled, however, special dunnaging is usually employed to provide air lanes and thus permit the circulation of cold air throughout the cargo. It is considered important to precool grapes, peaches, pears, and plums. Oranges are sometimes precooled, and sometimes shipped in the warm condition.

An interesting discussion of the dunnaging of boxed fruit is contained in a paper, "Old and New Problems in the Carriage of Food Overseas," prepared by A. J. M. Smith, of the Low Temperature Research Station, Cambridge, England,[10] a part of which follows:

> Most cargoes are kept from contact with the ship's deck, or tank-top, or sides, by means of fixed wooden battens. With refrigerated cargoes of boxed fruit, the traditional method of stowage also provided horizontal laths, usually ⅜ in. thick, between each tier of cases, in order to provide air spaces for ventilation and cooling. A cursory survey of the problem suggests that vertical spaces are likely, on the whole, to be more useful than horizontal spaces, at least in holds where natural convection plays an important part in distributing the cold air. Moreover, * * * it seems likely that more air will be induced to circulate if a few large air spaces are substituted for the larger number of small ones.
>
> In the experimental hold at the Ditton Laboratory, these ideas have been subjected to actual trial, on what approximates to the scale of commercial practice. The large vertical channels were kept open by light towers of latticed laths, and the name "tower system of dunnage" threatens to become perpetuated, although more recently it has been found convenient to use separating pieces between the cases, rather than towers, to keep the air shafts open.

[10] Journal of the Society of Chemical Industry, August 30, 1935.

As applied to a deep hold, the system provides for shafts descending to different levels in the cargo, for example, one-third, two-thirds, and the whole of the way down, and at each level horizontal dunnage is provided to complete the circulation. Cold air falls in some of the shafts, and warm air rises in others. The initial circulation is set up accidentally, but once established, it is stable and tends to persist.

Apart from any advantage in securing greater uniformity of temperature, the system economizes in space, in time for loading and discharge, and in material. It substitutes a few separators, which can be used over and over again, for the forest of laths, which were a source of embarrassment as well as expense, in holds traditionally dunnaged.

The stowage of fruit in spaces which are cooled by forced air movement is a separate problem. Horizontal dunnage is still employed in ships with horizontal air flow; but newer ships are more and more attempting to employ vertical air movement, and in these cases the advantage of using dunnage at all is problematical. The bulge of the fruit case itself ensures a considerable "porosity" of the cargo stack. Two years ago a refrigerated cargo of apples was "carried" in the experimental hold, perhaps for the first time in history, without any dunnage at all. Moreover, the fruit was packed in cases of the Tasmanian type, which lends itself to the closest stowage, and special precautions were taken to minimize the bulge. The distribution of temperature was just as uniform as it had been in dunnaged stacks, cooled by the same method, in previous seasons. Rather less than two months ago a commercial shipment of apples was carried from New Zealand without dunnage. It arrived in good condition, and a minor revolution in transport methods seems well on the way to accomplishment.

The carrying temperatures required for different fruits vary considerably, as is indicated below. It has also been found that fruits of the same kind, as for example, grapefruit, which have been grown in different districts, may require different temperatures during the ocean voyage. This is apparently due to the different kinds of soil and climate in the various growing regions, which produce different characteristics in the fruit. The shippers are usually in a position to recommend the temperatures which experience has shown to be most suitable for the particular fruit.

CITRUS FRUITS

Oranges, Lemons, Grapefruit.—The requirements for the carriage of citrus fruits under refrigeration from the United States Pacific coast to United Kingdom and European ports are given in the instructions issued by the California Fruit Growers Exchange, Los Angeles, [February 2, 1939] which are reprinted below. These instructions will serve as a general guide to temperature and other requirements for the carriage of citrus fruits in other trades.

INSTRUCTIONS FOR THE GUIDANCE OF STEAMSHIPS IN HANDLING ORANGES, LEMONS, AND GRAPEFRUIT FROM CALIFORNIA TO UNITED KINGDOM AND EUROPEAN PORTS

Precooling Chambers

All chambers should be thoroughly precooled to a maximum temperature of 32° F. at least 12 hours before loading is commenced. It is desirable that the air be circulated at maximum temperature of 40° F. through the chamber during the lunch hour or whenever the longshoremen are not working in the chamber.

Air Temperatures—Circulating Air Chambers

Oranges.—A discharge or return temperature of air from chamber of 39°–40° F. (carrying temperature) should be obtained as soon as possible and maintained during the entire voyage, observing a minimum of 34° F. for air delivery into the chamber. After the carrying temperature of 39°–40° F. has been

arrived at, the temperature of incoming air should be adjusted so as to maintain this carrying temperature.

Lemons.—A discharge or return temperature of air from chamber of 46°–47° F. (carrying temperature) should be obtained as soon as possible and maintained during the entire voyage, observing a minimum of 41° F. for air delivery into the chamber. After the carrying temperature of 46°–47° F. has been arrived at, the temperature of incoming air should be adjusted so as to maintain this carrying temperature.

Grapefruit.—A discharge or return temperature of air from chamber of 52°–53° F. (carrying temperature) should be obtained as soon as possible and maintained during the entire voyage, observing a minimum of 47° F. for air delivery into the chamber. After the carrying temperature of 52°–53° F. has been arrived at, the temperature of incoming air should be adjusted so as to maintain this carrying temperature.

Fan Speeds

Fans should be operated at full speed during the entire voyage, except that after the cargo is cooled uniformly to the carrying temperature the speed of the fans may be reduced, providing the difference between the incoming and outgoing air is not over two (2) degrees Fahrenheit. By maintaining a close split between incoming and exhaust air it will be easier to maintain the desired relative humidity and prevent excessive shrinkage of fruit in parts of the chamber.

Where agitator fans are used for circulating the air within a still-air cooled chamber, they should be operated at full speed during the entire voyage.

Air Temperatures—Still-Air Chambers

The air temperatures in the still-air chambers should be the same as mentioned above for carrying temperatures in circulating-air chambers for the respective fruit, not allowing the air next to boxes stacked closest to coils to go lower than minimum air delivery temperature suggested for circulating air chambers. After the air temperatures have been reduced uniformly to the carrying temperatures, the brine temperature in the coils should be adjusted to maintain the proper carrying temperatures.

Ventilating and Expelling Carbon Dioxide

For purposes of removal of carbon dioxide and other gases, fresh air should be introduced into the chambers for a period of not less than 20 minutes every 12 hours, unless equipment is provided for constant introduction of fresh air.

Where equipment is provided for constant introduction of fresh air, an amount equal to 2 percent (lemons and grapefruit 3 percent) of the total cubic feet of stowage space should be introduced into the chamber per minute. This amount of fresh air should be determined through the use of an anemometer, which should be a part of the ship's equipment. Additional fresh air is very desirable provided the required temperature and relative humidity can be maintained in the chamber.

The CO_2 concentration should not be allowed to go above one-tenth of 1 percent. Instruments for the determination of CO_2 should be a part of the ship's equipment.

Relative Humidity

The relative humidity in the chambers should be maintained at 82–85 percent. Instruments for determining the relative humidity should be a part of the ship's equipment.

Reversible Air

The direction of the air delivery into the chambers should be reversed every 6 hours where means for doing so have been provided.

Stowage

Oranges, lemons, and grapefruit should each be stowed in separate chambers so that the different fruit temperatures may be maintained.

All citrus boxes should be stowed on end, bulge to bulge and back to back, with the space between bulges parallel to the air movement.

Allow full 6-inch clearance from top box to ceiling of chamber.

All delivery and discharge duct openings should be kept free and unobstructed, leaving at least a 6-inch open space in front of openings.

When citrus boxes are stowed in a still-air chamber which is encircled with brine pipes, the boxes should be kept at least 12 inches away from the pipes.

If the stow should work out so that the top layer of boxes is stowed on the flat, it is important to leave space between those boxes so as not to form a "blanket" over the load.

All boxes should be stowed with the label end turned down when it is found necessary to work on top of a layer of boxes. Walking boards should be provided.

Citrus fruit should be handled as carefully as eggs in loading and discharging, as it is easily bruised, which results in decay and pitting.

Dunnage

Two pieces of 1- by 2-inch dunnage should be placed between all layers in every tier. Dunnage should parallel the direction of the air movement.

Chambers must be equipped with floor gratings or dunnage on floor sufficient to give 4-inch clearance above floor.

Lower holds that have permanent battings on the floors that do not conform to the size of the citrus boxes must have 1- by 3-inch dunnage laid across the battings to form floor gratings.

When the chamber contains more than five layers of boxes, a false floor of 1-inch boards of uniform thickness and standard lengths should be constructed as follows: 1- by 8-inch, 1- by 10-inch, or 1- by 12-inch spaced 3 inches apart and sufficiently nailed to hold boards in place across 2- by 3-inch dunnage which has been laid on every tier. This false floor should be laid on or about the middle layer in the chamber to provide a working platform for loading and unloading the upper half of the chamber.

Somewhat different conditions are required by a large California grower-controlled cooperative marketing organization which exports citrus fruits to the United Kingdom and Continent, as well as to the Netherlands Indies, Straits Settlements, China, and other Far Eastern destinations. This organization gives the following description of its requirements:

Our experience in exercising shows that the precooling of the fruit should be performed by the steamship companies. We do not care to export citrus that has been previously precooled. In other words, we strive to deliver fresh picked and packed fruit to the steamer. In this way we not only save the extra cost of precooling the fruit and the extra expense in transporting the fruit to the steamer, but we feel that our fruit avoids sweating and depreciating which may occur to fruit that is previously precooled before delivery to the steamer due to fluctuation of temperatures in handling and in transit.

Our temperatures at which we request refrigeration on the steamer vary, of course, according to the maturity of the fruit at time of shipping. The normal temperatures for oranges are 36° to 38°; grapefruit 45° to 50°, and lemons take the same temperature as oranges, the reason for this being that they are generally stowed in the same chamber on the steamer. We have requested temperatures as low as 34°–36° on oranges shipped late in the season for both navels and Valencias.

The steamship companies as a rule furnish ventilated refrigeration. If, however, the steamer is equipped with still-air refrigeration, we ask for two degrees lower temperature than those set forth above. All our fruit is processed and this fact, with the refrigeration requested, has provided very satisfactory deliveries in foreign countries.

Steamship companies carrying grapefruit on the relatively short voyage from Cuba to the United States advise that the fruit is carried under refrigeration at temperatures varying from 40° to 45° F., or else under ventilation.

Notes on the stowage of the most commonly carried fresh fruits other than citrus fruits are given below. The temperatures given were furnished by steamship lines experienced in the carriage of this class of cargo, but they must not be regarded as absolute requirements, as the temperatures requested by shippers may vary considerably in accord-

ance with the maturity of the fruit, the length of the voyage, and other factors.

Other Fruits

Apples.—Apples are commonly carried at a temperature range of about 31° to 33° F., the customary intake temperature being 31° to 32° F., and the discharge temperature 33° to 34° F., although, as in the case of some other fruits, different temperatures may be requested, owing to the variety of apple, the stage of ripeness when harvested, and other factors. Variations of temperature should be avoided, even though apples are not influenced by temperature fluctuations to as great a degree as are pears and other soft fruits.

Some apples are precooled before shipment, but under most circumstances apples are shipped in a warm or nonprecooled condition and should therefore be ventilated during carriage by placing laths or battens between the cases, unless some special consideration appears to make this seem unnecessary. (See mention above of New Zealand apples shipped without dunnage.) It is considered of the greatest importance, especially in "grid ships," to leave vertical air spaces between the cases to permit the cold air to circulate in a vertical direction.

A bulletin issued by the United States Department of Agriculture, Transportation of Apples From the Shenandoah-Cumberland Section to Overseas Markets,[11] makes the following observations:

> Apples shipped under refrigeration from points in the Shenandoah-Cumberland section via New York to England arrived at destination practically free from decay and in the best condition, and apples shipped without refrigeration were usually ripe upon arrival at destination, with varying amounts of decay and sometimes with internal break-down as well. Refrigeration during rail transit did not significantly retard the rate of softening. However, in many instances there were smaller percentages of decay in barrels refrigerated during rail transit.
>
> Fruit refrigerated during rail transit and forwarded under refrigeration aboard ship should be stowed by itself, in separate chambers if possible, since the data from tests made indicate that a large volume of warm fruit stowed in the same chambers causes an undesirable warming up of previously cooled fruit immediately after loading aboard ship and prolongs the time ordinarily required for the latter to reach a satisfactory carrying temperature.

Practically all steamship lines loading apples at Pacific coast ports use 3/8 by 1½-inch dunnage. Several years ago dunnage up to 1 by 1½ inches was used; but 3/8 inch is now the standard. A few lines no longer use any dunnage, but stow apples in the same manner as citrus fruit—namely, boxes on end, bulge to bulge, and back to back. Board slings or platform slings are now used almost exclusively when loading apples at Pacific coast ports. This type of sling consists of a flat wooden platform and two separators, one spreader slipping under each end of the loading board. This permits loading of the fruit without any pressure being applied against the boxes. Forty boxes to a sling constitutes a standard load of apples. Stowage factor on Pacific coast apples approximates 2.2 cubic feet per box, though some large vessels with very big refrigerated holds are able to reduce stowage to about 1.8 cubic feet.

Avocados.—Avocados are carried chiefly between Cuba and the United States. They are invariably carried under refrigeration by

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[11] Technical Bulletin No. 523, August 1936.

the large steamship lines and shippers are requested to precool wherever possible. The outturn of shipments is much better when the fruit has been precooled. The carrying temperature is maintained between 40° and 45° F.

Bananas.—The carrying temperature for bananas is usually from 53° to 55° F., and it must be closely controlled if damage to the fruit is to be avoided. Bananas are stowed in bins (see Refrigerated Ships, in chapter on Types of Oceangoing Vessels) and, usually, are not stowed more than approximately 7 feet high.

Investigations conducted by the Low Temperature Research Station at Trinidad, B. W. I., indicate that refrigeration of bananas should be commenced as soon as possible after loading. As soon as a deck has been loaded it should be sealed up by means of efficient baffles, the air thoroughly blown out, and refrigeration commenced without further delay. It should be the aim of the ship's refrigeration staff to deliver cold air at 53° F. within 12 hours at the most. Injuries caused by bad stowage must be carefully guarded against. Initial bruising resulting from tight stowage is small compared with the damage arising from loose stowage. Lateral movements of loosely stowed fruit—especially under the weight of superimposed bunches—lead to twisting and breaking of finger stalks and rupture of cushions, which is soon followed by fungal rotting. Damage from lateral movement owing to loose stowage is most likely to occur in the early stages of the voyage while the cargo is sagging.

Under tight stowage, particularly on the lowermost tier, the fruit in each bin sags slowly as a composite whole, and greater support is given to the stems of the ground tier, with a decided reduction in the percentage of so-called slanting stems, which normally weaken under the weight of superimposed bunches, bend, and finally break, resulting in the often seen badly wasted stalks and damaged first hands.

Cherries.—Cherries move in some volume from Chile and Argentina to the United States. They are usually carried at a temperature range of 35° to 38° F.

Grapefruit.—See Citrus fruits.

Grapes.—Grapes are shipped in considerable quantities from California to Europe and the Far East, and from Argentina and Chile to the United States. California grapes are packed in sawdust in lugs, chests, drums, and kegs, and are usually carried at a temperature of 31° to 32° F. Air circulation should be reversed every 6 hours if possible. At times, on short voyages, as from California to Hawaii, grapes packed in sawdust are given 'tween-deck stowage, well dunnaged, to allow free ventilation. Argentine grapes are carried north at a temperature of 33° F., and are dunnaged with strip dunnage about ¾ inch square running in the same direction as the air flow in the compartment. Chilean grapes are carried at a temperature range of 35° to 38° F.

Lemons.—See Citrus fruits.

Nectarines.—Nectarines are shipped from California to Europe and the Far East, and from Argentina and Chile to the United States. California nectarines are usually carried at a temperature range of 38° to 40° F., although sometimes at 36° F. Argentine nectarines

are brought north at a temperature of 33° F., and Chilean nectarines are carried at a temperature range of 35° to 38° F.

Oranges.—See Citrus fruits.

Peaches.—Peaches move in considerable volume from California to various destinations, from Argentina and Chile to the United States, and from South Africa to the United Kingdom and European ports. The California fruit is handled at a temperature of 31° to 32° F., and, to carry well, must be sound and well matured for sugar content but not overripe. Argentine peaches are carried north-bound at 33° F., and Chilean peaches at a temperature range of 35° to 38° F. Strip dunnaging about ¾ inch square is used for the Argentine fruit, and is laid so that it runs in the same direction as the air flow in the compartment.

Pears.—Pacific Coast pears are usually carried at a temperature of 30½° to 31½° F., or slightly higher, the customary intake temperature being 29° to 30° F., the discharge temperature 31° to 32° F. The Pacific-European Conference regulations require initial icing or precooling, designed to deliver pears at shipside at a core temperature not exceeding 45° F. The stowage factor on Pacific coast pears approximates 2 cubic feet per box; but some large vessels with very big refrigerated holds are able to reduce stowage to about 1.6 cubic feet. Dunnaging is the same as for Pacific coast apples. Pears and apples are stowed separately, as the former are precooled and the latter are shipped in the warm condition. At times, on short voyages, as from California to Hawaii, pears that have been picked while fairly green are given 'tween-deck stowage, well dunnaged to allow free ventilation.

Argentine pears are carried north-bound to the United States at a temperature of 31° F. Strip dunnage about ¾ inch square is used, running in the same direction as the air flow in the compartment.

Pineapples.—Steamship companies carrying pineapples from Cuba to the United States advise that the fruit is carried in accordance with the wishes of the shippers, some of whom prefer refrigeration and others ventilated stowage. The early pineapples, when very green, appear to carry very well under ventilation, but toward the end of the shipping season when the fruit is ripening fast, refrigeration appears to be desirable. The shipping season from Cuba lasts from about May 15 to July 1 each year, and the temperature at which the fruit is carried ranges from 50° to 55° F.

South African pineapples being shipped to the United Kingdom were originally carried at 34°–36° F. or 38°–42° F., depending on the nature of the other fruit in the hold, but continued experiments showed that the higher temperature of 45° should lead to a considerable improvement in the condition of the fruit on arrival, and this temperature is now reported to be the customary one in this trade.

Plantains.—Considerable quantities of plantains are carried from Cuba to the United States. The regular lines serving this trade report that they invariably carry plantains under refrigeration, at a temperature range of 50°–55° F.

Plums.—California plums are handled like grapes at a carrying temperature of 31° to 32° F., although slightly higher temperatures are sometimes requested, depending on the variety or maturity of the fruit, the length of the voyage, etc. The fresh prune types do not carry well on voyages lasting more than 15 days. Chilean plums are

brought to the United States under refrigeration at a temperature range of 35° to 38° F. Argentine plums are carried at 33° F. and are dunnaged with strip dunnage running in the same direction as the air flow in the compartment.

LOADING AND UNLOADING

The following suggestive comments on methods of handling fresh fruits in loading and unloading are taken from the bulletin, "A study of the Shipment of Fresh Fruits and Vegetables to the Far East." [12]

There should be no need to emphasize the necessity of careful handling of fruit boxes. It is evident that if the thin tops and bottoms of fruit boxes are subjected to pressure or rough handling, breakage of the container or bruising and crushing of the fruit or shattering from the stems will result. Even with strong containers, careless handling after a long carriage will invariably damage the contents of fruit and vegetable boxes. Yet the writer frequently observed at each of the ports visited in the Orient unpardonably rough handling of fruit by men whose interest and experience should have led them to exercise precaution.

During the loading and unloading, careful attention must be given to the manner in which fruits and vegetables are gotten on and off the ship. For fruit in boxes or crates, tray, rather than rope or wire, slings should be used for lifting the cargo in and out of the hatches. The "aeroplane" sling has come into use, and appears to be a good type, holding the boxes securely and yet not chafing or breaking them, or injuring the fruit with the ropes. The aeroplane sling consists of a rectangular platform fitted with ropes, passing from each corner through rings in the ends of spreaders to the hook on the tackle cable. The spreaders are comparable to 6-inch angle iron, the length of a box of fruit, placed over the side edges of the top box at each end to prevent the ropes from cutting into the boxes and to take the lateral strain. Nets extend from the spreaders to the floor of the platform at the two ends and ropes across the two sides.

It is possible that slings can be used for grapes in kegs packed with sawdust, but the kegs should certainly not be dumped or rolled out by lifting one side of the sling with the hoisting cable and pulling it from under. The sling should be disconnected if necessary and each keg lifted out and carefully placed on the dock before the sling is again hoisted to be returned to the hold.

Boards or skids should be placed in the square of the hatch upon which to land the goods; walking-boards for the men should be used to lessen possible damage to the cargo underneath.

The use of mechanical conveyors to carry the cargo on board and from the hatch to the part of the chamber where stowage is under way would lessen the possible breakage of containers. Boxes and crates should be of standard dimensions to permit best stowage.

Steamship companies whose vessels bring fruit under refrigeration to cold northern ports during the winter months usually make provision for preventing the fruit from being frozen after it has been discharged onto the pier and is waiting to be picked up by the consignee. The usual practice is to cover the fruit with canvas tents, the interiors of which are warmed by suitable heating devices.

GENERAL STOWAGE CONSIDERATIONS

The following observations on the stowage of fresh fruit cargoes are reprinted from Overholser: [13]

When possible, the loading of any particular chamber should be performed in one operation until the chamber is fully stowed. The frequent opening and

[12] Overholser, E. L. A Study of the Shipment of Fresh Fruits and Vegetables to the Far East. University of California Printing Office, July 1930.

[13] A Study of the Shipment of Fresh Fruits and Vegetables to the Far East, pp. 28–30.

closing of the chamber and the introduction of cargo at different times may tend to favor precipitation of moisture upon the cargo, and this "sweating" may result in damage. In loading the refrigerated holds of vessels, the fruit should be stored rapidly and in such a manner as to: (1) get as much fruit as possible in the space; (2) permit circulation of air around the fruit to cool it quickly to the desired temperature; (3) permit the ventilation necessary to remove gases given off by the fruit and to introduce oxygen; (4) arrange the containers firmly so that they will not be dislodged and thrown about by the motion of the ship in heavy seas; (5) allow ready discharge at the port of destination. Cooling air should be delivered over the top of the fruit, and suction should be accomplished by a wide trunk around the sides of the hold.

Before loading a refrigerated cargo, the heat should be removed from the air in the holds, from the insulation, and preferably from the cargo itself, by precooling. The greater the difference in temperature between the hot and cold sides of the insulation, the greater will be the amount of heat that will flow

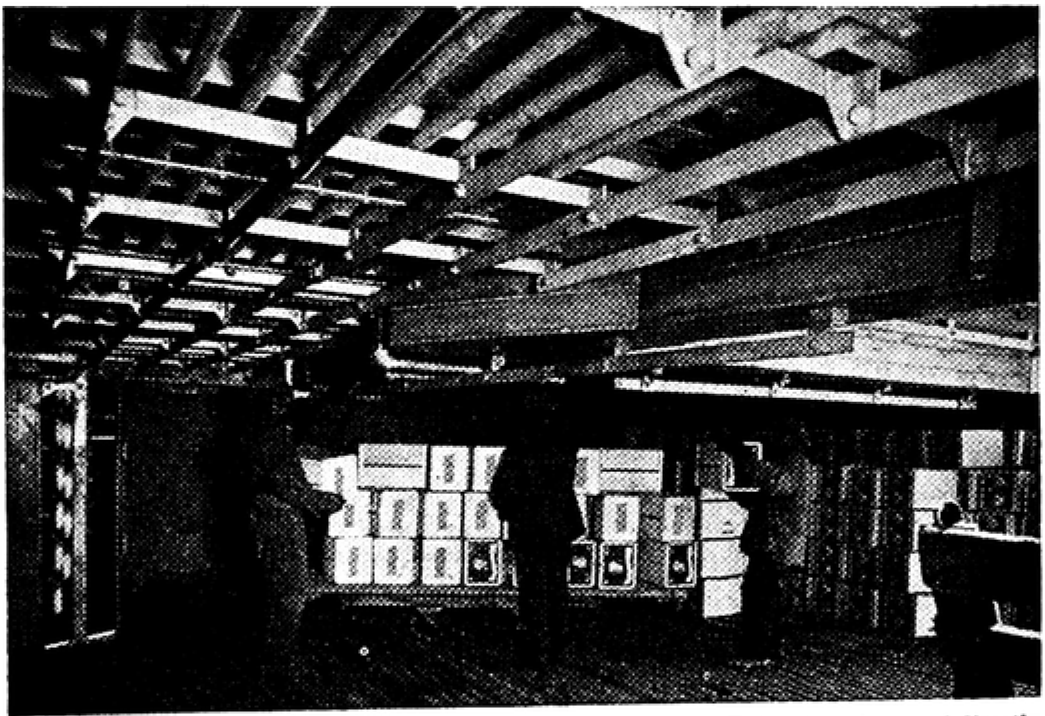

Figure 68.—Stowing fresh fruit in a refrigerated compartment. Entire tray is moved directly to pile where fruit is stowed without rehandling. Note frost-covered pipes at left, also burlap-covered battens leaving air space and protecting fruit from contact with brine pipes.

through the insulation. It is necessary under certain methods of construction, therefore, to provide means of allowing the heat to be carried off. This may be done by forming vertical air channels on the sides and bulkheads by cargo battens or at least 2 by 2 inch timber, securely fastened.

All air channels should be kept free, and no refrigerated produce should be stowed in direct contact with the insulation, since if the air channels are not maintained, the heat or cold, as the case may be, passing through the insulation would be more likely to be transmitted to the produce, and possible damage result (fig. 68).

Dunnage, or strips of board, at least 1 inch and preferably 2 inches thick, placed between the layers of boxes as they are stacked in the holds, should be used to provide for air circulation and to tie the load securely in place and lessen possible damage when the vessel is laboring in a heavy seaway. It appears advisable to place dunnage battens between tiers. The provision of vertical air channels is also desirable. For example, about every fifth tier, counting fore and aft, a vertical air channel about 3 inches wide may be formed with proper dunnage battens.

Furthermore, at every fifth layer of boxes a double layer of battens should be laid with the bottom layer placed fore and aft to create horizontal airways at right angles to each other. The boxes must be stowed well clear of overhead,

side, and bulkhead grids. Suitable dunnage should be used to allow free air circulation; other methods, such as wider stacking, cut down on the carrying capacity of the vessel and increase the possibility of broken boxes resulting from shifting of the cargo.

When possible, the cargo should be stowed at the same height throughout the hold, rather than close to the ceiling at one end or side and only halfway to the ceiling throughout the remainder of the hold. If the latter method of stowage is practiced, the air tends to be shunted around the high stacks and through the low stacks where the resistance is less. As a result, the center of the high stack, which needs more air, receives less. This is especially true if the air enters from the bottom of the hold.

In the stowage of a mixed refrigeration cargo the following points are considered: (1) Stability and trim of the vessel; (2) rotation of loading and discharge ports; (3) nature of produce; (4) temperature of cargo to be maintained; and (5) ventilation required. In the stowage of the fruit cargo with respect to possible temperature differences existing in the same compartment, grapes, especially those packed in sawdust in kegs, or chests, can be with greatest safety placed in the cooler positions, where the temperature may vary from 30° to 32° F. On the other hand, oranges, lemons, grapefruit, avocados, and potatoes should be stowed in the positions where the temperature may vary from 38° to 40° F., somewhat higher than the average in the compartment; otherwise physiological difficulties may develop. Other commodities can be placed where the temperature may vary from 32° to 34° F. Such differences are likely to exist in different positions of stowage in many marine refrigerated compartments and to be recognized by the ship's engineer.

Where there are marked differences in the rate of air movement, kegs and chests of grapes might withstand an excessive movement of air that would result in wilting of such commodities as celery, cauliflower, and lettuce (unless the latter was packed in veneer boxes with fine sawdust, in which case the excessive air movement may be beneficial). Apples and pears are benefited by a moderate air movement in contrast with stagnant air, because air circulation opposes the development of scald. Excessively rapid air movement, however, may result in undue loss of water with consequent wilting and shriveling.

Because of the fact that most fruit boxes are constructed with lighter material in the sides than in the ends, it has been found preferable to stow apples, pears, oranges, and grapefruit on end with bulge to bulge and back to back. In this manner there is more freedom for circulation of air.

CHAPTER X

COMMODITIES AND THEIR STOWAGE

The commodities described in this chapter, and for which in most instances stowage directions are given, are generally carried in relatively small lots as part of a "general cargo." Most of the major commercial products which make up the assorted cargoes loaded at the ports of the Orient, Australia, and New Zealand, the Near East, the various coasts of Africa, South and Central America, the West Indies, etc., are listed below.

In most cases the nature of the commodity is described so that the ship's officer or other person in charge of loading or stowage may know if, for example, it is odorous and therefore possibly injurious to other cargo; if it is delicate and consequently subject to tainting damage; or if in any other respect it possesses properties which dictate a certain type of stowage.

It must always be remembered, however, that stowage is subject to many varying factors, such as the size and type of vessel, the length and nature of the intended voyage, and the kind of packing employed. The stowage directions given in the following section should therefore be applied with due regard to the characteristics of the vessel being loaded, the nature of its voyage, and other related factors which may have a bearing on the stowage of the various classes of cargo offered and their safe carriage to destination.

Abaca fiber.—Manila hemp, shipped from the Philippine Islands and Netherlands Indies. A dry, clean cargo, with no objectionable qualities, but must be kept clear of oils, greases, etc., as it is liable to spontaneous combustion if it has been in contact with these substances. See Fibers.

Abalone.—Shellfish. The shell is used for inlay work, and the animal is used as a foodstuff in the Orient. No special stowage required.

Acacia gum (Gum arabic).—See Gums.

Acetaldehyde.—An inflammable liquid. See Dangerous Goods.

Acetate of lime.—A salt of acetic acid, usually shipped in barrels or bags. Requires no special stowage.

Acetic acid.—A combustible liquid. See Dangerous Goods. Acetic acid stowed in the lower hold with unprotected steel, according to the Board of Underwriters of New York, has in many cases caused considerable damage to the steel.

Acetic anhydride.—A combustible liquid. See Dangerous Goods.

Acetone.—An inflammable liquid. See Dangerous Goods.

Acetyl chloride.—A corrosive liquid. See Dangerous Goods.

Acetylene.—An inflammable gas. See Dangerous Goods.

Achiote.—This is another name for annotto; a dyestuff. It is usually packed in casks in a moist state and should be stowed as wet goods subject to leakage.

Acids.—See under respective names.

Bajra (*barjari, bajury, etc.*).—A variety of millet seed shipped from European and Mediterranean countries. Stowage as for leaves.

Acrolein.—Poisonous. See Dangerous Goods.

Acrylonitrile.—An inflammable liquid. See Dangerous Goods.

Agar (*agar-agar*).—A vegetable gelatine obtained from a seaweed and shipped largely from Japan. It is used medicinally and for other purposes. Usually packed in bales which as a rule should be stowed in a separate block because of the gummy nature of the commodity. Do not stow near tea.

Agave.—See Fibers.

Agricultural machinery.—Is usually packed partly in boxes, partly in crates, and some parts, such as wheels, shafts, and spouts, are usually shipped without packing. Because of their irregular shapes, weights, and sizes, these goods require special attention when being stowed to protect them against damage.

Air, compressed.—A compressed gas. See Dangerous Goods.

Ajinomoto.—A seasoning powder made from the glutinous part of wheat and used in China and Japan like salt. It is shipped from those countries in tins and bottles packed in cases. Should be given dry stowage as for foodstuffs.

Ajowan.—An aromatic Indian seed which is the source of ajowan oil and thymol, used medicinally. It is packed in bags and should be given stowage as for seeds.

Alabaster.—A form of gypsum exported from Spain, Italy, and elsewhere. Should not be stowed near goods liable to be damaged by moisture, and should be kept well away from oils which might stain it.

Albin.—A flaky mineral somewhat similar to mica, usually shipped in cases. Requires no special stowage, but must be protected from salt water.

Albumen.—A substance prepared from eggs and other materials and used for many purposes, such as fixing colors, etc. Shipped largely from China in both moist and dry conditions. The moist product is usually packed in tins in wooden cases and should be treated as wet cargo. It is sometimes shipped as frozen cargo and must then be carried in a refrigerated space. Dried albumen is frequently packed in tin-lined cases and is usually carried in refrigerated space. Other types of albumen are packed in bags and casks.

Alcohols.—Many alcohols are inflammable, combustible, or poisonous. See Dangerous Goods.

Alfa.—The Arabic name for esparto grass, which see.

Alfalfa seed.—Also known as lucerne seed. Stowage as for seeds.

Algaroba.—The Spanish name for carob beans, which see.

Alhenna.—See Henna.

Alizarin.—An orange-red powder used in dyeing. Stow away from foodstuffs or any articles liable to damage from siftage.

Alligator skins.—Shipped from Mexico and other countries, usually in bags or bundles. See Skins.

Allspice.—Also known as pimento and Jamaica pepper. The berries of a shrub grown chiefly in the West Indies, the principal supply coming from Jamaica, Mexico, and Guatemala. Usually packed in bags and, because of odor, should be given special stowage away from edibles and foodstuffs.

Allyl alcohol.—Poisonous. See Dangerous Goods.

Almonds.—Shipped from Spain, Italy, Morocco, Greece, China, and other countries, packed in bags, bales, barrels, and boxes. Dry fine cargo which should be well dunnaged and protected from moisture and taint.

Almond oil.—Shipped chiefly from the United Kingdom, France, and Italy. See Vegetable oils.

Aloes.—Shipped from Barbados, Venezuela, west coast of India, Saudi Arabia, Aden, Socotra, South Africa, and elsewhere. A vegetable product with a very bitter taste, used medicinally. Usually packed in boxes, but sometimes in bags or mats. Stow away from dry and delicate goods.

Althea or marshmallow root, also leaves and flowers.—These are exported chiefly from European countries and are used medicinally. Stowage as for leaves.

Alum.—A mineral salt used medicinally and for dyeing. Shipped from Asia Minor, Italy, China, and elsewhere, variously packed in barrels, baskets, kegs, and wooden boxes. Do not stow with dry or other cargo liable to damage from moisture, since alum readily absorbs and gives off moisture as temperature conditions change.

Aluminum nitrate.—An oxidizing material. See Dangerous Goods.

Aluminum ore or bauxite.—Shipped from British Guiana, Surinam, Yugoslavia, Greece, France, and elsewhere, either in bulk or in bags. Condition of bags should be noted and bags should be rejected if torn or otherwise liable to cause claims. See Ores in chapter on Stowage of Special Cargoes.

Amber.—A hard resinous substance used in the manufacture of beads and other products. Shipped chiefly from the Baltic countries. Stow as valuable cargo in a locked compartment.

Amboyna wood.—A valuable wood found on the island of Amboyna in the Netherlands Indies. Requires no special stowage, but should be kept dry. Unless stipulated otherwise in the bill of lading, it can be used for dunnaging fine dry cargo.

Ammonium arsenate.—Poisonous. See Dangerous Goods.

Ammonium bichromate.—An oxidizing material. See Dangerous Goods.

Ammonium chloride.—See Sal-ammoniac.

Ammonium nitrate.—An oxidizing material. See Dangerous Goods.

Ammonium perchlorate.—An oxidizing material. See Dangerous Goods.

Ammonium permanganate.—An oxidizing material. See Dangerous Goods.

Ammonium pichrate, wet.—An inflammable solid. See Dangerous Goods.

Ammonium sulfate.—This is not a dangerous product, but is odorous and will soak into wood. After a cargo of ammonium sulfate has been carried, the hold should be thoroughly washed out with water. Without such washing, foodstuffs should not be carried. In a recent case, a vessel unloaded a cargo of ammonium sulfate and prepared to load wheat. For this purpose, the holds were whitewashed. When the wheat cargo was discharged, it was found that the entire cargo was tainted by chemical action between the lime and ammonia, which produced ammonia gas.

Ammunition.—Dangerous explosives. See Dangerous Goods.

Ampalagua skins.—Exported from Argentina, usually in bales. See Furs, also Skins.

Amyl acetate.—An inflammable liquid. See Dangerous Goods.

Amyl nitrate.—An inflammable liquid. See Dangerous Goods.

Angelica, seeds and roots.—An herb used medicinally. Shipped chiefly from Germany, Belgium, and United Kingdom. Requires dry stowage.

Angora hair.—See Hair, animal.

Angosta bark.—See Barks.

Anhydrous ammonia.—A compressed gas. See Dangerous Goods.

Aniline oil.—A poisonous article, which will contaminate foodstuffs and damage textiles. Stow away from heated surfaces and from crew's quarters, also from bleaching powder, since the mixture of the gases of these two substances is dangerous. See Dangerous Goods.

Anime or animi.—A hard gum, also known as African copal. Usually packed in wooden boxes. Must be stowed in a cool place, well removed from boiler room and from goods liable to heat or give off moisture, such as areca nuts, jelatong, and gambier.

Anise oil.—An essential oil shipped from China, French Indochina, Japan, United Kingdom, and elsewhere. See Essential oils.

Aniseed.—The seeds of the anise herb; very light in weight. Shipped from Spain, Syria, China, Mexico, Bulgaria, and elsewhere. They are carried in bags and should be stowed in a dry place away from other goods that might be damaged by the odor.

Aniseed oil.—The oil extracted from aniseeds; shipped chiefly from Spain, Malta, and India. Stowage as for Essential oils.

Annatto (arnotto).—The pulp enclosing the seeds of the arnotto tree, from which a yellowish-red dye is made. Used for dyeing purposes and for coloring butter, cheese, and varnish, and shipped in bags and casks from Brazil, the Guianas, Jamaica, Ecuador, Dominican Republic, India, British Malaya, and elsewhere. If in casks, pickled, it should be treated as moist cargo. Annatto is odorous and should be stowed away from foodstuffs and other delicate cargo.

Antifreeze compounds.—May be inflammable or combustible liquids. See Dangerous Goods.

Antimony ore.—A very black ore, shipped chiefly from Honduras, Peru, Chile, and Mexico. If carried in bags, the bags should be carefully examined to see that they are neither full of holes nor perished as is frequently the case. Requires careful stowage in order to avoid contaminating other commodities by sifting. No odor.

Antimony compounds.—These are poisonous and should be stowed well away from foodstuffs and the like.

Antimony pentachloride.—A corrosive liquid. See Dangerous Goods.

Apples.—When shipped in ordinary cargo space, apples require careful and thorough ventilation. For this reason they should not ordinarily be stowed in the lower holds. See Fresh Fruits, also Refrigerated Cargoes.

Apricot kernels.—Shipped in bags and cases from China, Japan, and India. Dry stowage away from moist, oily, or odorous goods.

Arabic, gum (Acacia gum).—See Gums.

Arachides.—See Ground nuts.

Arachis oil.—The oil obtained from arachides or monkeynuts. Shipped in barrels, and leakage should be guarded against.

Archil.—See Orchella.

Areca leaves.—Shipped from Brazil, India, and elsewhere. See Leaves.

Areca nuts.—The "betel nut" of the Far East. Like many other nuts, these are liable to heat and should consequently be stowed well away from the boiler room, should be kept clear of all cargo likely to be harmed by the heat generated, and should be kept thoroughly ventilated. It is usually recommended that, on long passages, the hatches should be kept uncovered as much as possible. Damp or wet bags should be rejected, as damage is practically inevitable if the nuts are shipped in a damp condition. See Nuts.

Argol.—This is crude cream-of-tartar, an acid substance deposited from grape juice during fermentation and from wine lees, and is used in dyeing and for the manufacture of baking powder, and other products. It is shipped from Spain, France, Italy, Algeria, Argentina, and elsewhere. Usually packed in bags or kegs and should be given stowage as for foodstuffs.

Argon.—A compressed gas. See Dangerous Goods.

Ariranha skins.—These are shipped in bales, chiefly from Brazil. See Skins, also Furs.

Arrack.—A spirituous liquor distilled in many parts of the Far East from rice, sugar, and palm juices, and principally shipped from Batavia, Java. Special stowage, as for alcoholic liquors, and constant attention during loading to prevent pilferage. Leakage may be considerable.

Arrowroot and arrowroot starch.—A starchy food product, shipped chiefly from the West Indies, South America, and Ceylon. It is a delicate product and absorbs moisture very readily. Should be stowed in a dry place and away from other cargo that is odorous or likely to give off moisture.

Arsenate of lead.—See Lead arsenate.

Arsenic acid.—A poisonous article. See Dangerous Goods. If stowed underdeck, should be well away from foodstuffs. If any packages are damaged and leakage occurs, the compartment should be thoroughly cleaned before loading other cargo, particularly grain or other foodstuffs.

Arsenical compounds.—Such as arsenic bromide and arsenic chloride are poisonous. See Dangerous Goods.

Asefetida.—Shipped from Iran, India, and other Eastern countries. A gum-resin with a nauseating smell, which frequently remains for some time after the cargo has been discharged. Should not be stowed anywhere near foodstuffs or other cargo that would be affected by the smell, and, if possible, should be given separate stowage such as in a poop space.

Asbestos.—When clean, crude asbestos has no objectionable features and requires no special stowage. It is shipped chiefly from South and East Africa, and Canada. Manufactured asbestos products are shipped in many forms, such as cement in double bags, and asbestos packing in bags, bales, rolls, and boxes. When shipped as millboards in sheets packed in crates, these should be stowed on edge in top stowage with no weight above.

Asphalt.—A semihazardous article. See Dangerous Goods. Crude asphalt is shipped chiefly from Trinidad, but also from Venezuela, Peru, and Cuba. It is carried both in bulk and in metal drums and wooden barrels. When carried in bulk, the holds are usually lined to prevent the asphalt from adhering to frames and side plating. The lining and other parts with which the asphalt may come in contact are sometimes smeared over with mud or soft clay. Whitewash has also been used, but it is not as effective for preventing the asphalt from adhering. Precautions should be taken to prevent the asphalt from leaking down into the bilges. With bulk cargoes shifting boards are considered necessary.

Asphalt barrels and drums usually have open heads, and should be stowed on end. Packed in this way it is frequently carried on deck, but if stowed underdeck it should be placed in a cool place and separate from cargo that might be injured by its smell. It is advisable to put loose dunnage between the barrels or drums to prevent their damaging one another.

Attar of roses.—One of the most valuable essential oils used in perfumery. Shipped from Bulgaria, Turkey, Italy, United Kingdom, France, and elsewhere. It is frequently stowed in the ship's strong room to avoid theft. See Essential oils.

Automobiles.—When automobiles are driven alongside for shipment, the fuel tanks and lubricating oil cups, etc., should be thoroughly emptied of their contents and tank plugs firmly screwed in position. Many fires in compartments containing automobiles have resulted from neglect of this precaution. Special slings with spreaders should be used for slinging unboxed automobiles, and they should be landed on thin dunnage and the whole body securely lashed.

Automobiles should be moved by rolling by hand. Before putting them in the hold, put them in low gear or reverse and pull up the hand brake to make them immobile. The wheels should not be placed against sharp edges which might cut the tires. Lashings should be put on the axles, not on the body or chassis where they might injure the springs.

Awabi.—The Japanese name for abalone.

Babassu nuts.—A nut shipped in large quantities from Brazil, yields a valuable oil used in the manufacture of soaps. See Nuts.

Babassu-nut oil.—The oil extracted from the babassu nut. See Vegetable oils.

Badger hair.—Shipped in cases from U. S. S. R., and elsewhere. See Hair, animal.

Bacon.—Should be stowed in a cool, dry place and if shipped packed in salt, in cases, it should not be stowed over dry goods, as the salt will sometimes absorb moisture, leak out, and damage other cargo. Frequently shipped in refrigerated space.

Bagging.—See Burlap.

Bajra (barjari, bojury, etc.).—A variety of millet seed shipped from India. Stowage as for seeds.

Balata.—A substance similar to rubber, obtained from trees found chiefly in northern South America. Should be stowed in a dry, cool place, well away from moist articles.

Balsawood.—Shipped in bundles, chiefly from Ecuador. A very dry and light cargo. Must be stowed away from moisture, under-

deck. Do not overstow with heavy pieces that will mark the wood.

Balsams.—These are plant exudations or resins and are used medicinally. The most important are balsam of tolu, balsam of Peru, Canada balsam or Canada turpentine, balsam copivi (or copaiba), benzoin, or gum benjamin, jalap, castoreum, gurjun, Palembang benzoin, storax, etc. These are frequently shipped as liquids, but if the essential oil has been evaporated, they are shipped as solid resins. Castoreum, balsam of Peru, storax, and benzoin are usually shipped as the resin, while balsam copivi, Canada balsam, and gurjun, are nearly always shipped as liquid balsam in kegs, barrels, drums, or tins. The liquids should be treated as wet cargo. Some of the balsams, such as balsam copivi, have a very offensive odor and should be stowed entirely clear of foodstuffs and crew's quarters, as in a poop space or peak.

Bambarra.—A ground nut shipped from East Africa and Zanzibar. See Ground nuts.

Bamboo.—The stems of the bamboo plant, shipped in bundles. They should not be stowed under heavy cargo as they are easily split.

Banana powder.—A dry powder made from bananas and used in making beverages. Shipped in bags from Honduras, Ecuador, and elsewhere, and should be given good dry stowage as for delicate foodstuffs, susceptible to tainting.

Bananas.—See Fresh Fruit and Refrigerated Cargoes in chapter IX, Stowage of Special Cargoes.

Barbasco root.—See Cubé root.

Barbed wire.—See Wire, barbed.

Barium compounds.—Barium chlorate, barium nitrate, barium perchlorate, and barium peroxide are classed either as inflammable solids or oxidizing materials. See Dangerous Goods.

Barium cyanide.—A poisonous article. See Dangerous Goods.

Barjari.—See Bajra.

Barks.—Many different kinds of bark are carried in oversea commerce. They are used chiefly for medicinal and tanning purposes. The more important barks are mentioned in this section under their own names. They are shipped in bales, bags, and sometimes hogsheads, and when in bales and bags should be given careful handling since many are valuable commodities. Barks should be stowed away from oily, odorous, or moist goods to prevent their being tainted, and should be stowed in a dry part of the ship away from the machinery spaces. When free from odor or insects, they may be stowed with fine goods; but barks that are odorous should be stowed well away from foodstuffs and other delicate cargo. All barks should be protected from salt water, and hemlock bark, in particular, should be well protected from rain or wet, as it is easily damaged. All barks are light cargo, stowing at from 90 to 200 cubic feet per ton, and should not be stowed beneath heavy goods.

Barley.—Stowage as for Grain.

Barytes ore.—A heavy, usually white barium sulfate. Usually shipped in bags, and exported from Cuba, the Netherlands, Italy, Germany, and elsewhere. See Ores.

Basils.—A low-grade leather, usually shipped in bales or trusses. Requires no special stowage, except that it should be kept dry.

Batteries, electric storage, wet.—Contain corrosive liquid. See Dangerous Goods.

Bauxite.—See Aluminum ore.

Bayberry wax.—Shipped from Colombia and elsewhere in bags. See Waxes.

Beans.—Nearly every type of bean is likely to heat and, if shipped in a damp condition, to ferment and deteriorate. Beans should be well dunnaged or matted and given dry stowage away from goods, such as oils and turpentine, which might damage them by taint. Bean cake, similar to oil cake, should be well dunnaged and given dry stowage and stowed away from cargo that might cause tainting damage. Bean cake should not be stowed on newly sawn lumber. See Oil cake.

Bean oil.—This commodity is shipped from Manchuria, Japan, China, and a number of other regions, sometimes in bulk, when it is carried in deep tanks fitted for this purpose, and sometimes in barrels, cases, and tins. There is likely to be considerable leakage and this should be guarded against in selecting the place for stowage.

Beche-de-mer (Trepang).—A species of sea slug caught chiefly off the East Australian and New Guinea coasts and shipped in considerable quantities to China where they are a favorite article of diet. Usually packed in bags or bales. Should be given dry stowage and, if possible, kept away from cargo likely to be damaged by the beche-de-mer's disagreeable odor.

Beef.—Pickled salt beef is usually packed in casks and should be treated as wet cargo, liable to leakage. Stow well away from dry cargo and from odorous goods. Beef is now largely carried in a frozen or chilled condition. See Refrigerated Cargoes.

Beef casings.—These have a tendency to sweat and should not be stowed next to foodstuffs, such as flour or other susceptible goods.

Beer.—See Alcoholic Liquors, chapter IX.

Beeswax.—Shipped from Haiti, Guatemala, Chile, Spain, and elsewhere. Stow in a dry place and away from boilers. No odor. Beeswax melts at about 145°F.

Belladonna leaves.—The dried leaves of a poisonous herb, the deadly nightshade. Shipped in bales, chiefly from U. S. S. R., Yugoslavia, Italy, and Belgium. See Leaves.

Benzaldehyde.—A combustible liquid. See Dangerous Goods.

Benne (Benni seeds).—Sesame seeds, which see.

Benzene.—An inflammable liquid. See Dangerous Goods.

Benzine.—An inflammable liquid. See Dangerous Goods, also Petroleum products, in chapter IX, Stowage of Special Cargoes.

Benzoin (gum benjamin).—A gum resin used in making benzoic acid, incense, etc. Stow in a cool dry place. See Gums.

Benzol.—See Benzene.

Benzoyl chloride.—A corrosive liquid. See Dangerous Goods.

Benzoyl peroxide.—Inflammable. See Dangerous Goods.

Benzyl chloride.—A corrosive liquid. See Dangerous Goods.

Bergamot, oil of.—An essential oil shipped chiefly from Italy, France, and the United Kingdom. See Essential oils.

Beryllium ore (Glucinum).—A hard silver-white metallic element, used for making alloys. Usually shipped in bags, from Argentina, India, and South Africa. See Ores.

Betel nuts.—Another name for Areca nuts, which see.

Bicarbonate of soda.—See Soda.

Billets.—Steel billets should be kept clean and well away from oil, as there have been cases in which billets have been ruined for making tinplate, owing to contact with oils. See also Iron and steel.

Binder twine.—See Twine.

Biscuits.—Provide dry stowage, well away from other cargo which might damage the biscuits by taint.

Bismuth ore.—A reddish-white ore used for making alloys. Shipped in bags principally from Peru. Requires ordinary stowage in a dry place.

Bismuth, refined.—Usually shipped in bar form in cases. Requires dry stowage.

Bixa-tree bark.—The bark of the bixa or arnotto tree, which yields a yellowish-red dyestuff. Shipped in bales, chiefly from Chile. It is odorless. See Barks.

Blachan (balachong).—A Chinese condiment carried in the Far East trades. No special stowage required.

Blacklead.—Also known as plumbago and graphite. Shipped from India, Ceylon, Madagascar, and elsewhere. Usually packed in kegs, casks, or cases. There is likely to be considerable sifting of black-lead dust and it should not be stowed near other cargo that can be damaged by this dust. On long voyages it should not be stowed close to oil, as there appears to be some danger of combustion.

Black powder.—A dangerous explosive. See Dangerous Goods.

Blasting caps.—A dangerous explosive. See Dangerous Goods.

Bleaching powder (chloride of lime).—This commodity throws off strong fumes which will ruin textile goods stowed in the same compartment. If the fumes are allowed to accumulate, they will make it impossible for men to work in the cargo space. When possible, it is usually stowed on deck or in the poop or some other isolated compartment. Bleaching powder, according to the Board of Underwriters of New York, has caused serious damage to other cargo, owing to the blowing off of the filling hole plate in the drums releasing heavy fumes of chlorine gas.

Blood albumen.—A glutinous powder made from slaughter-house blood by clotting it and draining off the albumen. It is used in printing cotton textiles and in making glues, and is shipped from Argentina, Uruguay, and other countries. Should be given dry stowage away from foodstuffs and other delicate cargo.

Blood, dried.—Shipped in bags and cases from Argentina, Uruguay, and elsewhere, and used as a fertilizing material. If kept dry, it does not give off an offensive odor.

Bog ore.—An iron ore obtained from marshy places. Shipped from Poti, and elsewhere. It is carried in bulk and is likely to shift.

Boldo leaves.—Leaves of the boldo shrub of Chile are used in medicine. Shipped in bales and bags. See Leaves.

Bolts and nuts.—Because of the heavy concentrated weight of these goods they must be handled carefully so the boxes will not burst and the contents spill out. They are frequently useful as broken stowage.

Bombay hemp.—See Sunn fiber.

Bones.—Shipped from Argentina, Brazil, China, Morocco, Australia, and elsewhere, generally loose, and often used for dunnage and

broken stowage. If they are not dry they are likely to throw off disagreeable odors that will taint or contaminate other cargo.

Bone meal.—Shipped in bags from Argentina, Paraguay, Yugoslavia, India, and most of the European countries. Very dusty and odorous cargo. Should be stowed clear of dry goods and underneath other cargo that might be damaged by the dust sifting down or by contents of bursted bags, since the bone meal tends to rot the bags during the course of the voyage.

Boots.—No special stowage is required, but every precaution must be taken to prevent pilferage.

Boracic acid.—Should be given dry stowage, as for foodstuffs. Will not injure other cargo.

Borate of lime.—See Lime.

Borax.—Should be stowed with dry goods, as a foodstuff. Borax is known as "tincal" in China and is shipped under that name.

Bordeaux arsenites, liquid and solid.—Poisonous. See Dangerous Goods.

Boron trichloride.—A corrosive liquid. See Dangerous Goods.

Boron trifluoride.—A noninflammable gas. See Dangerous Goods.

Botargo.—A food made of mullet roe. Requires no special stowage.

Boussir (rice dust).—Chaff obtained from rice, which is used as a camel food. Should be given ordinary dry stowage.

Box-toe board.—Hazardous. See Dangerous Goods.

Box-toe gum.—An inflammable or combustible liquid. See Dangerous Goods.

Braid.—See Straw braid.

Bran.—Usually shipped in bags, but sometimes in bales. Should be given ordinary bag stowage and kept dry.

Brandy.—See Alcoholic Liquors, chapter IX, Stowage of Special Cargoes.

Brazil nuts.—Exported in bags, also bulk, from Brazil, Bolivia, and Argentina. Must be protected from rain while loading or discharging, and should be rejected if in a damp condition. Very likely to heat, and when shipped in bulk they should be turned over from time to time to allow air to circulate. See Nuts.

Brewers' grains.—The residue of grains that have been used in brewing, which are used for cattle feed, shipped in bags from Argentina and elsewhere. Stowage as for bagged grain.

Bricks.—Usually stowed in a solid block separated from other cargo by straw, dunnage, or matting. They should be stowed evenly on the deck or ceiling, and if a spar ceiling is fitted it should be boarded over to make a platform. Bricks should not be used for chocking off other cargo, as they are likely to break or crumble.

Brimstone.—See Sulfur.

Briquets.—Patent fuel made of coal-dust, pitch, etc., and molded into blocks. Should be stowed solid and given good ventilation as they often have a strong odor. When this is the case they should not be stowed near any goods which they might taint.

Bristles.—Pig and other bristles, shipped chiefly from Russia, China, and Denmark. They are very valuable and care must be taken to prevent pilferage. May be carried in the ship's strong room or special locker. If placed in the hold, stow with dry cargo and cover over with other goods at once in order to prevent pilferage. Bristles

may give off odors, especially when packed with a powder or other protective preparation.

Bromacetone.—A poisonous article. See Dangerous Goods.

Brombenzyl cyanide (*tear gas*).—A poisonous article. See Dangerous Goods.

Bromine.—A corrosive liquid. See Dangerous Goods.

Bromobenzene.—A combustible liquid. See Dangerous Goods.

Bromomethane, liquid.—See Methyl bromide, liquid.

Bronzing liquids.—Frequently inflammable. See Dangerous Goods.

Brooms.—Usually weak packing. Stow on top of other cargo, under the beams.

Brucine.—A poisonous article. See Dangerous Goods.

Brunak (*poonak*).—An oil cake, the substance left after all the oil possible has been extracted from copra. Said to be subject to spontaneous combustion. Stow in a cool place with good ventilation and well away from fine goods. Do not put heavy cargo over brunak. See also Copra.

Buchu leaves.—Dried leaves used for medicinal purposes. Usually shipped in bales or bags, and exported from South Africa. See Leaves.

Buckwheat.—Should be stowed clear of odorous or other goods that might cause damage by tainting.

Buffalo hides.—Shipped from India, the Netherlands Indies, British Malaya, and China, in considerable quantities, usually packed in bales. See Hides.

Bulbs.—Shipped principally from the Netherlands. Require careful handling and should be stowed in a dry, cool place.

Bullion.—Uncoined gold and silver shipped in the form of ingots or bars. Must be stowed in the strong room or safe. All operations of loading, tallying, and handling must be supervised with the utmost care by the ship's officers.

Burlap.—Sacking made of jute and used for making bags, separation cloths, etc. Shipped in rolls packed in bales. Keep away from vegetable oils, especially linseed oil and turpentine, since burlap stained with these substances is in danger of spontaneous combustion. Do not permit the use of hooks in loading or discharging. See Dangerous Goods, as certain types of burlap cloth are classed as hazardous articles.

The Board of Underwriters of New York points out that in some cases turpentine is loaded in a compartment in which there is some bagging forming part of the inward cargo, the bagging being destined to the last port of discharge. They state that in their opinion this is dangerous stowage and should not be permitted even though the bagging would only be in the same compartment with the turpentine for a few days.

Butane.—An inflammable gas. See Dangerous Goods.

Butter.—Carried chiefly in refrigerated spaces. If no such space is available, butter should be stowed in the coolest possible place and should be kept away from cargoes such as turpentine, fish, and bones which would damage it by taint.

Butyl acetate.—A combustible liquid. See Dangerous Goods.

Butyl alcohol.—A combustible liquid. See Dangerous Goods.

Butyl ether—A combustible liquid. See Dangerous Goods.

Cable (or large chain).—Should be stowed athwartship in the lower hold, if possible, beneath all other cargo.

Cable, electric.—Covered with rubber, lead, or other protective material and wound on drums. The larger drums weigh several tons and require careful handling and stowage. Should be stowed below all other cargo and fore and aft, if possible. If not blocked off with other cargo, they should be well lashed, because if they start working during the voyage they can cause considerable damage to nearby cargo.

Cabrettas skins.—Shipped in bales from northern Brazil. See Furs, also Skins.

Cacao butter.—Should be stowed in as cool a place as possible, otherwise it is likely to melt; also away from any cargo subject to damage by possible leakage.

Cacodylic acid.—A poisonous article. See Dangerous Goods.

Cadmium.—A metal carried either in powder form or in small sticks of metal and used as a yellow coloring agent. Requires no special stowage.

Caetetu skins.—Shipped in bales from Brazil. See Furs, also Skins.

Cajeput oil.—An essential oil derived from the bark of a tree and exported from the Netherlands Indies. See Essential oils.

Cake lac.—See Lac.

Calcium arsenate.—A poisonous article. See Dangerous Goods.

Calcium arsenite.—A poisonous article. See Dangerous Goods.

Calcium carbide.—A hazardous article. See Dangerous Goods.

Calcium chlorate.—An oxidizing material. See Dangerous Goods.

Calcium chloride.—Not a dangerous article if properly packed in airtight drums. Absorbs moisture from the atmosphere and will liquefy. Stow in a dry, well-ventilated place away from foodstuffs and acids.

Calcium chlorite.—An oxidizing material. See Dangerous Goods.

Calcium cyanamide.—A hazardous article. See Dangerous Goods.

Calcium metallic.—An inflammable solid. See Dangerous Goods.

Calcium nitrate.—An oxidizing material. See Dangerous Goods.

Calcium perchlorate.—An oxidizing material. See Dangerous Goods.

Calcium permanganate.—An oxidizing material. See Dangerous Goods.

Calcium peroxide.—An oxidizing material. See Dangerous Goods.

Calcium phosphide.—An inflammable solid. See Dangerous Goods.

Calcium silicide.—Should be packed in metal drums and stowed in a dry place.

Calumba (colombo, etc.).—A bitter root used medicinally. Stow as for barks.

Camata (camatina).—Acorns which when more mature are called "valonia," which see.

Camomile (chamomile) flowers.—A strong-scented bitter herb, the flowers of which are used as a tonic. Exported from Hungary, Yugoslavia, Belgium, and elsewhere. See Leaves.

Camphene.—A hazardous article with a very strong smell which persists long after the cargo has been discharged. It is not suitable,

therefore, for underdeck stowage in a vessel that is to carry fine goods on the next voyage. See Dangerous Goods.

Camphor.—Shipped from China, Japan, India, Borneo, and elsewhere. A hazardous article. See Dangerous Goods.

Camphor oil.—A combustible liquid, largely shipped from Japan, in drums. Usually stowed in poop or other similar compartment or on deck. It gives off a very sharp, penetrating odor. Do not stow near tea. See Dangerous Goods.

Canada balsam.—A gum resin with a bitter taste and peculiar smell. Stow away from foodstuffs and other goods subject to damage by taint.

Canaigre (canagra) root.—A root used for tanning and dyeing. yielding a yellow dye, which is shipped from Mexico, usually in bags. Stowage as for barks.

Cananga oil.—See Ylang-ylang.

Canary seed.—Shipped from Morocco, Turkey, South America, and elsewhere. See Seeds.

Candelilla wax. A yellowish wax obtained from a Mexican shrub. used as a substitute for beeswax and in making varnishes, polishes, phonograph records, and electrical insulation. Stowage as for waxes.

Candles.—Should be stowed in a dry, cool place to prevent possible melting.

Candy.—See Confectionery.

Canella.—The inner bark of the West Indian canella tree, sometimes called "wild cinnamon." Likely to taint fine goods. Stowage as for cinnamon.

Canned goods.—Should be given good square stowage if possible, or may be used as beam filling or broken stowage, if carefully placed. Stowage should be arranged so as to prevent pilferage, which is frequently heavy with this class of cargo. Stow away from cargo liable to sweat and throw off moisture, including wet or newly sawn lumber. See section on "Damage Due to Temperature Changes During the Voyage" for suggestions regarding ventilation to prevent sweat or moisture damage.

Cantal fiber.—See Maguey.

Canvas.—Should be kept dry to prevent rot, and should be stowed clear of metal surfaces such as stanchions, etc., to avoid damage by staining. Canvas should also be stowed to prevent damage by chafing.

Capivara skins.—See Carpincho skins.

Caps, blasting.—An explosive material. See Dangerous Goods.

Caps, torpedo.—Explosive. See Dangerous Goods.

Capsicum.—Dried pods of a pepper tree. Shipped from Japan, Egypt, Mexico, French Africa, Italy, East and West Africa, and elsewhere. Stow in a well-ventilated space away from delicate goods.

Caraway seed.—A small seed shipped from the Netherlands Indies, U. S. S. R., Syria, Tunisia, and elsewhere. See Seeds.

Carbolic acid.—A poisonous article. See Dangerous Goods.

Carbon bisulfide.—An inflammable liquid. See Dangerous Goods.

Carbon black.—See Lampblack.

Carbon dioxide.—A compressed gas. See Dangerous Goods.

Carbon disulfide.—See Carbon bisulfide.

Carbon monoxide.—An inflammable gas. See Dangerous Goods.

Carbon remover.—An inflammable liquid when possessing a flash point of less than 80° F. See Dangerous Goods.

Carbonyl chloride (phosgene).—A poisonous article. See Dangerous Goods.

Cardamom seeds.—The seeds of a plant of the ginger family, used medicinally and as a condiment, shipped in cases and tins from Ceylon, Singapore, Malabar Coast ports, Guatemala, and elsewhere. They are highly aromatic and should be stowed away from tea, sago, tapioca, and other similar delicate foodstuffs. Stow in a cool place.

Cardboard.—Shipped in bundles, bales, cases, etc. Bundles and bales, in particular, should be stowed on a flat surface to avoid distortion.

Carmine.—A red coloring substance derived from the cochineal insect. Stow away from goods which might be damaged by sifting.

Carnauba wax.—A brittle yellowish wax obtained from the carnauba palm and used in the manufacture of candles, shoe polish, varnish, etc. Shipped chiefly from Brazil, in bags. See Waxes.

Caroa fiber.—This is shipped from Brazil in bales and bundles, and is used in making rope and twine. See Fibers.

Carob beans (algaroba or locust beans).—The dried pods of the carob tree, used chiefly as cattle feed, and shipped from Egypt, Italy, Algeria, Cyprus, Spain, and China. Usually packed in bags or barrels, but sometimes shipped loose in bulk. Require no special stowage, but should be well ventilated.

Carpets.—Usually shipped in bales or rolls and, owing to their value, should be given particular attention. Stow in a clean dry place, well dunnaged, and properly blocked off to prevent chafing against stanchions, beams, etc. Cargo hooks must not be used in loading or discharging.

Carpincho (capivara, capybara) skins.—The skins of the carpincho or capybara, a large South American aquatic rodent of the guinea-pig family, which has a coarse fur. Shipped in bales chiefly from Uruguay and Brazil. See Furs.

Carthamus seed.—See Safflower, also Seeds.

Cartridge bags.—See Dangerous Goods.

Cartridge cases.—See Dangerous Goods.

Cascalote.—This is the same as divi-divi, which see.

Cascarilla bark.—The aromatic bark of a tropical shrub, used in making perfumery and incense and as a tonic. Shipped in bales from the Bahamas. See Barks.

Casein.—A compound found in milk, the principal ingredient of cheese. It is used in prepared foods, such as egg substitutes, also in paints and glues, plastics, etc. Shipped dry in bags and wet in barrels, also in tin-lined cases, chiefly from Argentina, and New Zealand. Give the bags good dry stowage as for bagged goods. Barrels should be given wet stowage, owing to possibility of leakage.

Case oil.—See Petroleum products, chapter IX.

Cashew nuts.—Shelled cashew nuts are shipped chiefly from India, Brazil, and Haiti, frequently in tins in cases or in tin-lined cases. To insure sound condition on arrival and to avoid deterioration and infestation by worms, shipments on long voyages are sometimes carried in refrigerated space. This is not necessary when the nuts are packed in vacuum airtight packing. Ordinary stowage is in a dry place, away from any commodities which spread an odor.

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Cashew-nut oil and cashew-nut shell oil.—See Vegetable oils.

Casinghead gasoline.—An inflammable liquid. See Dangerous Goods.

Casings.—The intestines of cattle, sheep, hogs, and other animals. Exported in barrels by the United States, Argentina, Chile, Japan, and other countries. Have an odor and are usually stowed in lower hold away from foodstuffs or other commodities subject to contamination. Likely to sweat. Handled as wet cargo.

Cassareep.—A condiment made from the juice of the cassava plant. Shipped in cases chiefly from the Guianas. Ordinary dry stowage.

Cassava.—See Mandioca and Tapioca.

Cassia.—The dried bark of the "false cinnamon," used as a substitute for cinnamon and shipped from Singapore, China, Netherlands Indies, Indochina, Madagascar, and elsewhere. Stow clear of other cargo, such as tea, that might be injured by the scent. See Barks.

Cassia buds.—These are somewhat heavier than the bark. Stow as for cassia.

Cassia oil.—The oil prepared from the leaves and twigs of the cassia plant, and an essential oil. Shipped from China, United Kingdom, and elsewhere. See Essential oils.

Cassiterite.—See Tin ore.

Castanhas.—These are Brazil nuts, which see.

Castor oil.—The oil obtained from the castor-plant seed. Shipped in barrels and drums from Indian and other Eastern ports. It has a disagreeable smell and should be stowed away from cargo that it might taint. Leakage should also be guarded against. See Vegetable oils.

Castor seeds (castor-beans).—The seed from which castor oil is obtained. Shipped from India, Haiti, Brazil, Argentina, and other countries. See Seeds.

Catechu (also called terra japonica and cutch).—An extract high in tannin content obtained from the plant *Acacia catechu* and used in tanning. Shipped from India, Burma, Malaya, and other countries in bags and boxes, also in small square bales. Catechu may melt during the tropical part of the voyage and will then set very hard as the ship reaches cooler latitudes. It should be stowed apart from fine and perishable goods, also from cargoes such as jelatong, pepper, and sago flour that are likely to throw off moisture. Catechu stows well on top of gambier, however, it is stated by ship's officers experienced in the Far Eastern trades.

Cattle.—See Livestock, chapter IX.

Cattle hair.—Shipped from Mexico and Dominican Republic, in packages and ballots. See Hair, animal.

Caustic potash.—A corrosive liquid. See Dangerous Goods.

Caustic soda, liquid.—A corrosive liquid. See Dangerous Goods.

Caustic soda, solid.—Hazardous. See Dangerous Goods.

Cedar slats.—Strips of cedar board used for making cigar boxes, lining furniture, covering lead pencils, etc. Should be protected against taint.

Celery seed.—A valuable seed, shipped from France, India, Italy, and elsewhere. Should be given dry stowage. See Seeds.

Celluloid, scrap.—An inflammable solid. See Dangerous Goods.

Cement.—Shipped in cloth and paper bags and in barrels. A very dusty cargo; fine goods should be covered when cement is being loaded

into or discharged from the same compartment. Cement should never be stowed with ammonia. When in barrels, it should not be stowed too high or the bottom tiers will be crushed. Not more than nine tiers is the general recommendation as to height of stowage.

Cements, liquid, roofing, and rubber.—Many of these are classed as inflammable liquids. See Dangerous Goods.

Cerasin.—A gum obtained from the cherry tree, and used medicinally. Stowage as for gums.

Ceresin.—A yellow or white wax made by purifying ozokerite, used as a substitute for beeswax. It is shipped from the Netherlands Indies, Italy, France, and elsewhere. Stowage as for waxes.

Chalk.—Usually shipped in barrels, but sometimes in bulk. Should not be stowed over fine goods. When carried in bulk, other cargo should be covered to protect it from the chalk dust.

Charcoal, activated, animal, bone, and briquets.—Inflammable solids. See Dangerous Goods.

Charcoal screenings.—An inflammable solid. See Dangerous Goods.

Chasam.—Silk waste from the mulberry silk; packed in bales. Stow as for silk.

Cheese.—Most cheese is now shipped on long voyages in refrigerated space. If shipped in ordinary cargo space, care should be taken to keep it cool and away from cargo likely to damage it by taint. See Refrigerated Cargo.

Chemical ammunition.—See Dangerous Goods.

Chestnuts.—Shipped from China, Italy, Portugal, Japan, and other countries, in bags and boxes. Should be stowed in a cool place.

Chick peas (garbanzos).—Shipped from Mexico in considerable quantities, in bags. Dry stowage, away from such goods as turpentine and oil which might cause tainting.

Chicle.—A gum shipped from tropical America, used for making chewing gum and as a substitute for gutta-percha. Shipped in the form of cakes, in bags and bales. Stowage as for gums.

Chickery.—Must be kept thoroughly dry or it will turn moldy.

Chile saltpeter.—See Nitrate of soda.

Chilies (dry).—The pods of the capsicum plant. Shipped from the Netherlands Indies, West Indies, and West Africa, and used in making various condiments. Should be stowed in a well-ventilated place away from delicate cargo.

China bark.—See Cinchona.

China clay (kaolin).—A white clay used in manufacturing porcelain, paper, and many kinds of powders, shipped in bulk and in barrels from Cornwall and Devon in England, also from Belgium, France, and Germany. Requires no special stowage, but the dust, being of a greasy nature, will damage other cargo if the latter is not protected during loading and discharging.

China grass (rhea fiber).—A nettle fiber used for fine-cloth making. See Fibers.

China root.—A root shipped from Japan and China for use as a dyestuff. Packed in bags, barrels, and boxes. Should be given ordinary dry stowage.

Chinaware.—Packed in various ways, as barrels, crates, boxes, and baskets. Very light cargo which must be handled carefully owing to

the great possibility of breakage. Do not stow heavy goods on top of chinaware.

China wood oil (*tung oil*).—The oil obtained from the nuts of the tung tree and shipped from Japanese and North China ports, packed in barrels and tins, which are frequently second-hand. The danger of leakage is very great, and it is recommended that all containers that may leak or are already leaking be absolutely refused. The stowage should be given particular attention, and plenty of dunnage should be used. There are usually many odd-sized barrels and these should be put to one side, so that uneven tiers will be avoided, and later placed in the top tier. Owing to the nature of the barrels used, stowage should not be too high; five or at most six tiers is the usual recommendation. The top tier should be boarded over to protect cargo above from oil damage, and only very light cargo should be placed above the oil.

Chinese groceries.—Usually not very well packed, and liable to leakage. Stow in a cool place as wet cargo and protect other cargo from possible leakage.

Chiretta.—A dried plant used medicinally as a tonic, febrifuge, and laxative, and shipped from India. Usually packed in bales, and should be given ordinary dry stowage.

Chloracetophenone.—Tear gas. See Dangerous Goods.

Chloracetyl chloride.—A corrosive liquid. See Dangerous Goods.

Chlorate of potash.—See Potassium chloride.

Chloride of lime.—See Bleaching powder.

Chloride of phosphorus (*phosphorus trichloride*).—A corrosive liquid. See Dangerous Goods.

Chloride of sulfur (*sulfuric chloride*).—A corrosive liquid. See Dangerous Goods.

Chlorine.—A poisonous compressed gas. See Dangerous Goods.

Chlorpicrin.—A poisonous article. See Dangerous Goods.

Chocolate.—Should be stowed in a cool dry place and kept clear of cargo that might damage it by taint.

Chow chow.—See Chinese groceries.

Chrome ore (*chromium*).—Shipped from Africa, Cuba, Greece, New Caledonia, and elsewhere. See Ores, in chapter IX.

Chromic acid.—An oxidizing material. See Dangerous Goods.

Chunam.—An Eastern name for lime, which see.

Churrah.—See Gums.

Cigarettes.—Require dry stowage to protect them against possible moisture damage.

Cigars.—All possible precautions should be taken against pilferage: the ship's strong room is frequently used for this purpose. Should be stowed away from foodstuffs, such as tea, sago, and tapioca, which might be tainted by the odor of the cigars.

Cinchona.—Also called China bark, Peruvian bark, and Jesuit's bark. A dried bark used medicinally and shipped from Ecuador, Ceylon, Netherlands Indies, and Guatemala, usually packed in bales. Has no objectionable qualities. Should be stowed in a dry place away from odorous goods. See Barks.

Cinnabar.—The ore from which mercury is chiefly obtained. It is usually shipped in bags and requires stowage where it will not get damp or be subjected to undue pressure. Has poisonous qualities and so should be kept away from foodstuffs.

Cinnamon.—The bark of the cinnamon tree. It is usually packed in bags, bundles, or boxes, and is shipped from Ceylon, the west coast of India, Java, Sumatra, China, and South America. It is a valuable cargo and should be stowed in a dry place away from foodstuffs and other cargo that might be injured by the smell of the cinnamon. Oil of cinnamon is an essential oil, and is shipped from Ceylon, East Africa, United Kingdom, France, and elsewhere. See Essential oils.

Citronella oil.—A pungent smelling, essential oil used in insecticides and shipped from the Netherlands Indies, Ceylon, Guatemala, and elsewhere. See Essential oils.

Cleaning fluids.—Many of these are inflammable or combustible liquids. See Dangerous Goods.

Cloth goods.—These products, such as wearing apparel and rolls of cloth, are frequently packed in bales. They require no special stowage but should be kept dry and clear of damp or oily articles.

Clover seeds.—Must be stowed in a thoroughly dry place, for otherwise they will deteriorate during the voyage. See Seeds.

Cloves.—The buds of a tropical tree which are gathered before they open and are then dried. Shipped from Zanzibar, Mauritius, and the East and West Indies. Should be stowed in a dry, well-ventilated space well away from foodstuffs that might be damaged by the highly aromatic scent of cloves; also clear of liquids and moist or wet goods, as cloves will absorb moisture.

Clove oil.—An essential oil shipped from Madagascar, East Africa, and elsewhere. See Essential oils.

Coal.—See Stowage of Special Cargoes.

Coal gas.—An inflammable gas. See Dangerous Goods.

Coal-tar distillates.—The lighter distillates are highly inflammable. See Dangerous Goods.

Coal-tar light oil.—See Benzene.

Coal-tar naphtha.—An inflammable liquid. See Dangerous Goods.

Cobalt.—An ore used in the production of steel for high-speed cutting tools and for permanent magnets. Shipped from Canada, Belgian Africa, Australia, and elsewhere. Usually shipped in bulk. See Ores, in chapter on Stowage of Special Cargoes.

Cobalt resinate, precipitated.—An inflammable solid. See Dangerous Goods.

Coca leaves.—The dried leaves of the coca tree of Peru and the Netherlands Indies, from which the anesthetic cocaine is derived. Usually shipped in bales. It is very light cargo and should be stowed in a dry, well-ventilated space.

Cocculus solid (fishberry).—A dried, ripe fruit used medicinally and as an insecticide. A poisonous article. See Dangerous Goods.

Cochineal.—A small, red insect from which a dye is procured. Approximately 70.000 insects go to 1 pound of cochineal. Shipped from Peru, Canary Islands, India, Java, and elsewhere. It is a valuable cargo, has a sickly smell, and deteriorates from heat and moisture. Stowage in the ship's strong room is recommended, because of the valuable nature of cochineal; but if the strong room is likely to be hot, cool and well-ventilated space should be arranged.

Cocksfoot seed.—See Seeds.

Cocoa (cacao).—Cocoa beans are the seeds taken from the pods of the cacao tree. They are packed in bags and are shipped from the

Gold Coast, Trinidad, Brazil, Ecuador, Venezuela, Mexico, Central America, and elsewhere. The beans are likely to heat and should be stowed in a dry place away from moist goods and articles likely to damage the beans by taint, and should be kept well-ventilated during the voyage.

Coconuts.—Generally shipped in bags or fiber nets. Should not be stowed beneath or close to dry sugar or delicate goods, as coconuts are likely to heat, particularly if damp when loaded.

Coconut cake.—See Brunac.

Coconut fiber (coir).—The fiber obtained from the husk of the coconut and used in the manufacture of matting, brushes, rope, etc. Shipped in bales and dholls or small bundles, chiefly from India, Ceylon, and the Netherlands Indies. In the latter packing it makes excellent broken stowage or beam filling, but if it is in the oily state it should be kept away from goods that might be damaged by the oil. See Dangerous Goods.

Coconut oil.—The oil extracted from the dried kernel of the coconut (copra), and extensively used in the manufacture of soap, margarine, etc. It is usually carried in barrels and leakage is likely to be considerable. A common practice is to reserve space for this cargo on the floor of the lower holds and to fill in broken stowage with dholls of oily coir, which are shipped from the same ports. If jute, cotton, or other similar dry cargo is to be stowed on top of coconut oil, the oil should be well boarded over and matted to prevent the oil being drawn upward to the dry cargo. Mats alone are not sufficient to prevent this.

It is also customary to clean the bilges before coconut oil is loaded so that the oil leakage can be recovered in clean condition. Fine or delicate goods easily tainted should not be stowed in the same compartment with coconut oil.

If stowage in the 'tween decks cannot be avoided, it is recommended that the drain pipes should be sealed over with cement to prevent the oil from running down into the bilges, to avoid the blocking of the drain pipes, and to facilitate recovery of the oil when discharging. Coconut oil solidifies at a temperature of 60° to 70° F. For this reason the ship's pumps should not be used on the bilges of a compartment containing this cargo, since if the oil is drawn into the pipes and valves of the pumping system, these cannot be cleared without disconnecting the entire system.

Coconut oil is now carried in large quantities in bulk, the ship's deep tanks being used for this purpose. See Vegetable oils.

Cocoons.—The covering of the silk-moth and certain other insects from which silk is derived. The boxes or bags containing cocoons should be treated as valuable cargo and given special stowage. The bags are very bulky and should be stowed on top of all other cargo so they will not be pressed or crushed.

Codilla.—The coarsest part of flax and hemp. See Hemp.

Coffee.—Shipped in bags of various weights from Brazil, Central America, northern South America, Haiti, East Africa, Aden, and elsewhere. It is recommended that holds in which coffee is to be loaded should be thoroughly cleaned and well dunnaged, especially at the turn of the bilge, on cement caps, stringers, etc. The sides of the holds should be lined with separation cloths or, if these are not available, with mats, in order to protect the coffee bags from

contact with dunnage and other surfaces that might stain them. In some trades, ships that are to carry coffee are dunnaged with bamboos as for rice cargo, and it is stated that this gives good results. Stanchions and other parts that might chafe the bags should be well covered with mats or burlap.

When carried as part of a mixed general cargo, coffee should be stowed away from wet or moist cargo; goods such as turpentine, smoked rubber, guano, cubebs, and other odorous cargo that might damage the coffee by taint; and goods likely to heat and sweat. The ventilation should be carefully attended to throughout the voyage to keep the coffee beans dry and prevent deterioration. (See fig. 69.)

Coir.—See Coconut fiber, also Dangerous Goods.

Coke.—Shipped both in bags and in bulk. All precautions should be taken to prevent the dust from coke reaching other cargo stowed

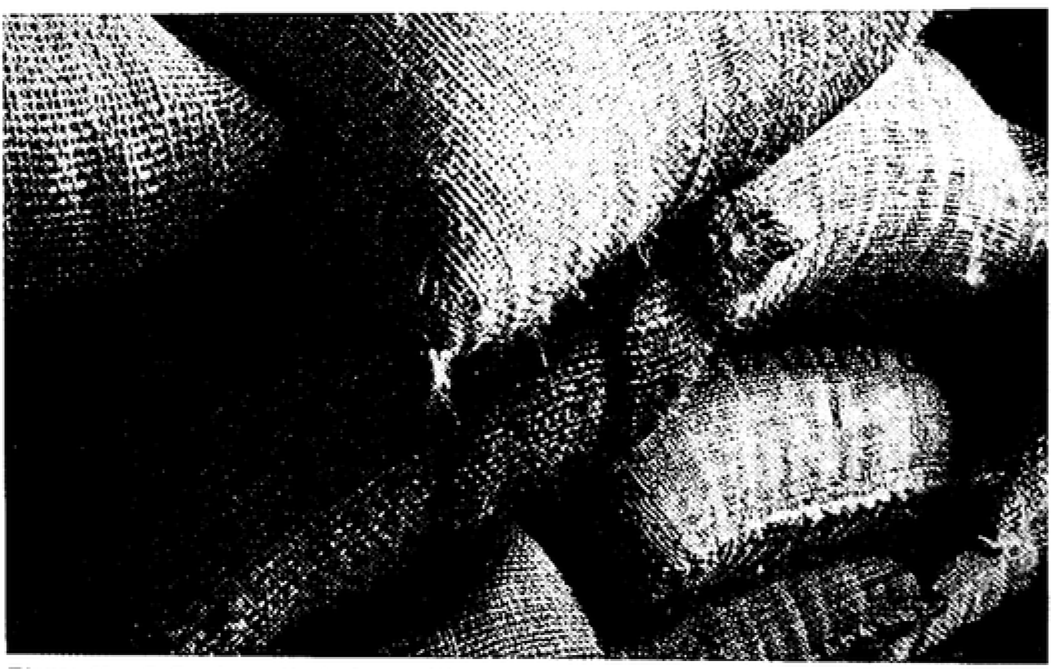

Figure 69.—Coffee is particularly sensitive to excessive moisture. Hence, it should be packed in loosely woven bags allowing air to circulate freely.

nearby. Cotton and other fibers should not be stowed in the same compartment, on account of the dust; and foodstuffs and other goods likely to be tainted by coke should not be stowed in the same compartment. Coke should generally be stowed on the floor of a hold and, if other cargo is to go above it, the coke should be well trimmed and boarded over. Coke has a tendency to settle to a considerable degree, and for this reason heavy cargo should not ordinarily be stowed on top of it. Coke requires good surface ventilation and will absorb moisture up to about 20 percent of its weight. This fact should be borne in mind when carrying a large deck load on a vessel inclined to be tender. See also Coal and Coke, in chapter IX.

Cola (kola) nuts.—The seeds of a Brazilian and West Indian tree, used medicinally and for food. See Kola nuts.

Collodion.—An inflammable liquid. See Dangerous Goods.

Colomba (columba).—A variation of Calumba, which see.

Colophony.—See Rosin.

Columbium ore and concentrates.—A metallic element of steel-gray color found combined in columbite and various other minerals, and almost always associated with tantalum, which it closely resembles chemically. It is used in making stainless steels, and is shipped from Brazil, Nigeria, and elsewhere, usually in bags. See Ores, in chapter IX.

Colza oil.—Colza or rape-seed oil is derived from the seeds of the cole and rape plants. The unrefined oil is known as brown rape oil, and the most refined product is called colza oil. It is shipped from Argentina, India, and elsewhere, in barrels and drums, and all precautions against leakage should be observed.

Concentrates.—Partially washed or concentrated ores. Copper, lead, and zinc concentrates are largely shipped in bulk in powdered form, and should be stowed as heavy ores. The various concentrates are also shipped in small quantities in bags. See Ores, in chapter IX.

An instruction issued by the Board of Underwriters of New York states that "Ore concentrates containing sulphides shipped in bags or in bulk are liable to spontaneous combustion and should not be stowed in a hold or deck with any other cargo liable to damage. Some types of concentrates contain a large percentage of moisture and when shipped in bulk are liable to shift, in which case heavy shifting boards should be erected, and the bilge suction should be kept free."

Condensed milk.—Chiefly carried in tins packed in wooden boxes. Every care should be exercised in handling to prevent denting of the tins, and all precautions taken to keep the cargo dry and properly ventilated to prevent rusting, loosening of labels, etc. See chapter VIII, "Damage from Temperature Changes During the Voyage."

Condurango bark.—The bark of the condor vine, shipped chiefly from Peru and used in tanning and dyeing. It is odorless and is packed in bags and bales. Stowage as for barks.

Confectionery.—Many kinds of confectionery are likely to be damaged by heat, which causes them to melt and deteriorate. As a consequence, more and more confectionery is being carried in refrigerated spaces, particularly on voyages to the Tropics and the Far East. If no refrigerated space is available, confectionery should be treated as foodstuffs, be given dry stowage, and protected as much as possible against heating and sweating.

Coodie.—A name given to broken rice. See Rice, in chapter IX, Stowage of Special Cargoes.

Copaiba, copahyba or copivi.—Balsam of copaiba, a liquid used medicinally. Exported from Brazil. See Balsams.

Copal, gum.—See Gums.

Copper.—This commodity is shipped in many forms, such as ingots, bars, cathodes, and slabs; and in manufactured form as wire, rods, etc. It requires no special stowage, but when in the form of ingots, bars, and the like, it is preferable to stow it on the deck or ceiling of a lower hold or 'tween deck. Pilferage must be attentively guarded against, as this is valuable cargo, and it is recommended that copper be overstowed with other goods immediately after loading. For the same reason, copper should not be worked in or out at night if this can possibly be avoided.

Copper acetoarsenite, solid.—Poisonous. See Dangerous Goods.

Copper arsenite, solid.—Poisonous. See Dangerous Goods.

Copper matte.—This is crude copper ore or native metal. See Ores, in chapter on Stowage of Special Cargoes.

Copper ore.—This should not be overstowed with oils or other cargo of an oily nature.

Copper sinter.—Shipped in bags from west coast of South America. Requires top stowage with plenty of ventilation. Must not be loaded into ship if a high percent of humidity is present.

Copper sulfate.—This is blue vitriol or blue copperas. See Copperas.

Copperas.—Also called green vitriol. A green substance used in making dyes, inks, and medicines. Usually shipped in barrels, but sometimes in bags, boxes, and in bulk. It frequently rots the containers. Stow well away from foodstuffs and in a dry place, since it gives off steam when mixed with water.

Copra.—The dried kernel of the coconut, which is shipped in large quantities, both in bulk and in bags, chiefly from the Philippines, South Sea Islands, Netherlands Indies, and Jamaica. It has a distinctive oily smell that will taint foodstuffs if stowed near them. It should not be carried in the same vessel with tea unless the two cargoes can be separated by the engine and boiler rooms. Copra is very liable to heat, and careful attention must be given to ventilation to permit the moisture and odors to escape from the cargo spaces. Copra that is wet or that has been imperfectly dried may deteriorate during the voyage and give off fumes—carbonic acid and carbonic oxide gases—that are dangerous to life. Copra is very quick to catch fire from sparks and burns fiercely once it is aflame, owing to its oily nature. It must be stowed away from boiler-room bulkheads and other heated spaces and every possible precaution must be taken against fire. See Dangerous Goods.

Stowage Factors of Copra

Measurement of copra, bulk or sacked, depends on the way in which the nuts are cut up, i. e., whether into halves, quarters, or eighths; also as to the length of time the copra has been in storage before loading and the care taken in stowing. In many of the Pacific Islands sacked copra is packed in whatever old second-hand bags are available, the weights running from 70 to 250 pounds to the sack.

Bulk copra.—Stowage on five cargoes of bulk copra from Sydney were recently reported as follows (in cubic feet per ton of 2,000 pounds): 71, 66, 63, 64, 70, or 66.8 cubic feet per short-ton average.

The vessel that carried the cargo stowing at 71 cubic feet has had two cargoes direct from the Fiji Islands that stowed at 62 and 67 cubic feet per 2,000 pounds, respectively.

Stowage on nine cargoes of bulk from the South Sea Islands direct ranged from 58 to 67 cubic feet per 2,000 pounds, and averaged 62.3 cubic feet.

Sacked copra.—Stowage on one cargo of sacked copra from Sydney: 77 cubic feet per 2,000 pounds. Leading South Sea shippers report (1) South Sea Island copra in bags, average stowage 82 cubic feet per 2,000 pounds; (2) average stowage on copra in bags, 80 cubic feet per 2,000 pounds; and (3) about 70 cubic feet per 2,000 pounds for bags containing eighths, and 76/80 for bags containing larger pieces.

Of two large cargoes of sacked copra recently discharged at San Francisco from Manila, one cargo averaged 78/80 cubic feet per 2,000 pounds, with but little bleeding of sacks, and the other cargo averaged 72/74 cubic feet per 2,000 pounds, with fair amount of sacks bled.

Actual measurements on sacks of copra follow: 1 sack, 6.25 cubic feet, weight 165 pounds; 1 sack, 6 cubic feet, 141 pounds; 1 sack, 5 cubic feet, 130 pounds; 1 sack, 3 cubic feet, 70 pounds.

Coquilla nuts.—The fruit of the Brazilian coquilla palm, which provides a substance used in the manufacture of buttons, etc. The nuts are usually shipped in bags and should be given dry stowage clear of moist cargo. See Nuts.

Cordeau detonant.—A relatively safe explosive. See Dangerous Goods.

Coriander seeds.—The seeds of a tropical plant which yield a highly aromatic spice used for cooking and flavoring. Usually packed in bags and shipped chiefly from North Africa, Central Europe, and India. Should be given dry stowage away from tea and other delicate goods likely to be damaged by the smell.

Cork.—The outer bark of a tree growing in Spain, Portugal, Algeria, and elsewhere. It is usually pressed into slabs and packed in bales, but is also often shipped, in the form of bottle corks, in large bags. Granulated cork or cork dust, used for the manufacture of linoleum, is shipped in bags or pressed bales.

Cork is dry cargo and is very light. Low-grade cork is almost always poorly packed and, as it also crumbles, it must be handled with great care. Do not stow it too far from the square of the hatch, handle the bales with care, and avoid stowing any other cargo on top, for it makes a poor first tier. In loading or discharging, bales should never be slung by the hoops. It frequently happens that a ship loading copper ore in southern Spain will fill up all its empty space with cork. When this is done the copper ore should be carefully covered with separation cloths; otherwise small pieces of cork may get mixed in with the ore and heavy claims may result. Granulated and ground cork are classed as hazardous articles. See Dangerous Goods.

Corn.—The term "corn," as used in Great Britain, usually applies to all kinds of grain. In the United States it applies to Indian corn or maize only. This product is exported in large quantities from Argentina, Russia, Rumania, South Africa, and the United States. It is very likely to heat, sweat, and turn sour, and many heavy claims for damage have resulted. Much of this damage is the result of corn having been subjected to moisture prior to shipment, and it is very difficult to determine its exact condition at time of shipment. The ship is frequently protected in some measure against claims arising from the above cause by qualifying the bills of lading with a clause similar to: "Shipped in apparent good condition," or "Weight, quality, quantity, and condition unknown."

When about to load corn, the holds should be thoroughly matted and dunnaged, and all metal parts where condensation is likely to collect should be well covered. Corn should be stowed away from the boiler-room bulkhead and should be kept well away from cargo such as flour, oats, bran, canned goods, delicate and dry goods, also wool, all of which are likely to be damaged by moisture. No cargo of the above types should be stowed above corn. Ventilation of compartments containing corn should be carefully provided throughout the voyage.

Corn flour.—Shipped in bags and also in packaged form in boxes. Should be stowed away from cargo likely to damage it by taint.

Corn mint oil.—An essential oil shipped from Japan. See Essential oils.

Corozo nuts (*tagua nuts*).—Obtained from a South American palm; a vegetable ivory. Shipped in bags, largely from Ecuador and Colombia, and used for making buttons, etc. Should be given dry stowage away from wet or moist cargo or heat. Will become infested with weevils if bags are allowed to lie in the open in hot weather.

Corundum ore.—An extremely hard aluminum oxid used for polishing, in the manufacture of emery, etc. Shipped chiefly from India and South Africa, usually in bags. It is valuable and requires stowage in a safe place. See Ores.

Cotton.—See Cotton, in chapter on Stowage of Special Cargoes.

Cotton batting.—Susceptible to fire from sparks and also subject to spontaneous heating and possible ignition when wet or in contact with animal or vegetable oil or gases. A hazardous article. See Dangerous Goods.

Cotton linters pulp or cut linters.—This commodity, according to the Board of Underwriters of New York, contains cotton in quantity and therefore should be classified as cotton and stowed in accordance with the Board's Cotton Rules, as well as the Board's Fire Fighting Regulations governing vessels carrying cotton. For the Board's rules, see Cotton, in the chapter on Stowage of Special Cargoes.

Cottonseed.—The seed of the cotton plant which yields an edible oil. It is shipped from all cotton-producing countries, both in bags and in bulk. Cotton seed sweats heavily and care should be taken to give it adequate ventilation. It should not be stowed over damp ore or comparable cargoes.

Cottonseed cake.—Usually shipped in bales or bags, but sometimes loose. It is easily damaged by moisture and by taint if stowed near or among odorous goods. Requires thorough dunnaging and good ventilation. When cottonseed cake is being loaded at southern United States ports, particular care should be taken to keep it clear of turpentine fumes, as turpentine is often carried in the same vessel.

Cottonseed hull fiber and shavings.—These commodities, according to the Board of Underwriters of New York, contain cotton in quantity and therefore should be classified as cotton and stowed in accordance with the Board's Cotton Rules, as well as the Board's Fire Fighting Regulations governing vessels carrying cotton. For the Board's rules, see the section on Cotton, in the chapter on Stowage of Special Cargoes.

Cottonseed meal.—This commodity, according to the Board of Underwriters of New York, contains no sign of cotton and as such can be carried under deck without the application of the Board's cotton rules.

Cottonseed oil.—The oil obtained by crushing the seed of the cotton plant. It is shipped from most of the cotton-producing countries, sometimes in barrels and sometimes in bulk. Should be given regular barrel stowage, care being taken to protect other cargo against possible leakage. When shipped in bulk, it is sometimes necessary to have heating coils fitted (during the winter months) as the oil solidifies at between 34° and 50° F.

Cotton waste.—A hazardous article. See Dangerous Goods. The Board of Underwriters of New York states that:

Cotton waste, mill sweepings, and similar materials free of oil can be stowed under deck provided it is properly baled and covered with bagging. Any of these commodities containing not more than 5 percent by weight of animal, vegetable, or mineral oils, if properly baled may be stowed in any deck or hold providing ordinary cotton is not stowed in the same deck or hold. These commodities may also be stowed in the forward end of a bridge deck, or the after part of a shelter deck separated from ordinary cotton. They may be stowed in the fore or after peaks, fo'c'sle, or poop. In motor vessels, they may be stowed in the bridge deck. Cotton waste, mill and oily sweepings containing more than 5 percent of mineral oil only requires on-deck stowage. Cotton waste, mill and oily sweepings containing more than 5 percent of vegetable or animal oil is prohibited.

Covadonga seeds.—These are shipped in bags from Haiti. See Seeds.

Cowgrass.—A wild species of clover used for animal fodder. Requires no special stowage.

Cowrie shells.—A small white shell, shipped chiefly from the Seychelles, usually packed in bags. When clean and free from dirt, requires no special stowage.

Cream-of-tartar (argol).—Stowage as for foodstuffs.

Creosote.—Shipped in barrels and drums, and a very undesirable cargo owing to its smell. Must be kept away from foodstuffs and all other cargo that might be tainted, and preferably stowed in a poop space or other isolated compartment. It should not be stowed in the lower hold, since it will be impossible to remove the leakage from the wood ceiling. See Dangerous Goods.

Creosote oil (dead oil).—A combustible liquid. See Dangerous Goods.

Creosol (cresylic acid).—A combustible liquid. See Dangerous Goods.

Crocotaju skins.—Shipped in bales, chiefly from northern Brazil. See Skins.

Croton oil.—An oil obtained from the seeds of the croton plant, and used medicinally. See Vegetable oils.

Crin fiber.—A fiber shipped in considerable quantities from Morocco and Algeria. See Fibers.

Crotonaldehyde.—An inflammable liquid. See Dangerous Goods.

Crude oil.—An inflammable or combustible liquid. See Dangerous Goods.

Cubé (timbo or barbasco) root.—A root that yields rotenone, used as an insecticide. Shipped in bags and bales from Peru, Brazil, and Venezuela. Dry stowage, away from moist, oily, and odorous goods, and heat. No odor.

Cubebs.—The dried berries of a shrub, possessing a pungent, sickly smell. Shipped from the Netherlands Indies and British Malaya. Should not be stowed near delicate cargo, such as tea, sago, coffee, tapioca, or cigars.

Cudbear.—A lichen which yields a maroon dyestuff, shipped in considerable quantities chiefly from the United Kingdom, France, and Netherlands. It is a kind of archil. Should not be stowed near damp goods, as it will absorb moisture from them.

Cumaru cake.—Obtained from the South American tonka-bean tree and used in the manufacture of coumarin, flavoring extracts, and

perfumery. It is shipped in bags, chiefly from Brazil, and should be given dry stowage away from moist or oily goods, and from foodstuffs that might be affected by its fragrant vanillalike odor.

Cumin (cummin) seed.—Aromatic seeds with a bitter taste, used medicinally and as caraway seeds for flavoring. Shipped in bags from Morocco, Algeria, Syria, Cyprus, and other Mediterranean regions, also India, Ceylon, and Iran. Should be given dry stowage away from foodstuffs and other delicate cargo. See Seeds.

Curicuri wax.—Shipped in bags from Brazil. See Waxes.

Currants.—Usually packed in boxes and shipped in large quantities from Greece, Asia Minor, and other Mediterranean regions. Should be well ventilated to prevent heating and fermenting.

Cusparia bark (angostura bark).—The aromatic bark of the South American cuspare tree, used as a tonic and febrifuge. Shipped in bales. Should not be overstowed with heavy cargo. See Barks.

Cutch.—A mangrove extract. Cutch is the trade name for mangrove extract in the United States, but it is often confused with gambier or terra japonica and catechu (from which the name "cutch" is derived) which is likewise sometimes called terra japonica.

Cuttlefish.—A mollusk which yields cuttlebone, used for polishing fine metals, etc. Should be given ordinary dry stowage.

Cyanide of calcium.—A poisonous article. See Dangerous Goods.

Cyanide of potassium.—A poisonous article. See Dangerous Goods.

Cyanide of sodium.—A poisonous article. See Dangerous Goods.

Cyanogen.—A poisonous gas. See Dangerous Goods.

Cyclopropane.—An inflammable gas. See Dangerous Goods.

Cylinders, empty.—May be hazardous, if they have contained inflammable liquids, etc. See Dangerous Goods.

Dagame staves.—These are made from the timber of the tropical American dagame tree and are shipped in bundles chiefly from Cuba. See Staves.

Dagga or Indian hemp.—Stowage as for hemp.

Damar (Dammar).—See Gums.

Dandelion root.—Shipped in bags from Italy, India, and the Netherlands, and used medicinally, also like chicory as a substitute for coffee. Ordinary dry stowage away from oily, moist, or odorous goods.

Dangerous goods.—See chapter IX, Stowage of Special Cargoes.

Dari (Dari Jowaree).—A variety of the Indian millet seed. See Seeds.

Dasheens.—A tropical plant related to the taro, the roots of which form a staple food in the Tropics. Shipped chiefly from the Azores, Madeira, Dominican Republic, Japan, China, Netherlands Indies, Cuba, and Portugal. Dry stowage as for foodstuffs.

Dates.—Shipped chiefly from North Africa, Persian Gulf, and China, in both a wet and dry condition. Wet dates should be treated as wet cargo and should not be stowed over goods that might be damaged by the juice draining down on them. It should also be noted that wet dates frequently cause considerable sweat in a hold by giving off moisture. Dry dates should be given ordinary stowage for foodstuffs.

Dead oil.—See Creosote oil.

Decahydronaphthalene (decalin).—A combustible liquid. See Dangerous Goods.

Deer skins.—Shipped in bales in considerable quantities chiefly from China, Thailand, New Zealand, Australia, Central America, and French Oceania. See Skins, also Leather.

Derris or tuba root.—The root of an East Indian plant which yields rotenone used in the preparation of insecticides. Shipped in bales from British Malaya, Netherlands Indies, Philippine Islands, and elsewhere. Dry stowage, away from moist, oily, or odorous goods.

Dextrine.—A brownish-white substance prepared from starch and used as an adhesive for postage stamps, envelopes, etc. It is usually shipped in bags and should be stowed in a dry, cool place.

Dhall (dal).—A name commonly used for the split grain of a large number of pulses, used as a foodstuff in India, Arabia, and elsewhere. Stowage as for bagged grain.

Diazodinitrophenol.—A dangerous explosive. See Dangerous Goods.

Dichlorodifluoromethane.—A compressed gas. See Dangerous Goods.

Dichloropentanes.—Combustible. See Dangerous Goods.

Digitalis leaves.—The dried leaves of foxglove, used as a heart tonic. Shipped chiefly from United Kingdom, Canada, Italy, and Belgium. See Leaves.

Diisobutyl ketone.—Combustible. See Dangerous Goods.

Dill seed.—An aromatic seed used medicinally and for cooking. Stowage as for seeds.

Dimethylamine.—An inflammable liquid. See Dangerous Goods.

Dimethyl ether.—An inflammable gas. See Dangerous Goods.

Dimethyl sulfate.—A corrosive and poisonous liquid. See Dangerous Goods.

Dimethyl sulfide.—An inflammable liquid. See Dangerous Goods.

Dinitrobenzol, liquid and solid.—Poisonous. See Dangerous Goods.

Dinitrochlorobenzol.—A poisonous article. See Dangerous Goods.

Dinitrotoluene, liquid.—Combustible. See Dangerous Goods.

Diphenylaminechlorarsine.—Tear gas. See Dangerous Goods.

Diphenylchlorarsine.—Tear gas. See Dangerous Goods.

Disinfectants, liquid.—Some of these are combustible or corrosive. See Dangerous Goods.

Divi-divi.—The pods of the divi-divi tree, which contain tannin, and are used for tanning and dyeing purposes. Shipped chiefly from Central America, northern South America, Java, India, and Australia. It is usually packed in bags and should be stowed in a cool, dry place.

Dogskins.—Odorous and should be stowed well away from foodstuffs and other delicate goods. See Furs, also Skins.

Dolomite.—A semihazardous article. See Dangerous Goods.

Dragon's blood.—See Gums.

Dried blood.—See Blood, dried.

Driers, paint and varnish.—May be inflammable or semi-inflammable liquids. See Dangerous Goods.

Dross.—Refuse, particularly metallurgical. Usually in the form of pigs or slabs, it requires no special stowage. See Kettle dross.

Druggets.—Coarse woolen rugs, made in India and shipped in rolls. Ordinary dry stowage. The use of hooks should be forbidden when loading or discharging.

Drums, empty.—These may have contained hazardous goods and therefore are considered as hazardous articles. See Dangerous Goods.

Dura (dhurra).—Also called Indian millet, Guinea corn, and Turkish millet. A small seed used for poultry food and in some countries as a rice substitute. Stowage as for seeds.

Dyestuffs.—The principal vegetable materials used as dyestuffs are referred to under their individual names, such as cochineal, divi-divi, lac, and mirabolans, and notes on stowage are given in these sections.

Dyewoods.—Woods from which dye matter is obtained, some of the principal kinds being aspenwood, camwood, fustic, lima, logwood, sandalwood, and sapanwood. They are usually heavy and are generally shipped in small pieces which require no special stowage except that they must be protected from water, which may seriously damage them by discoloration.

Earthenware.—Because of the danger of breakage, every effort must be made to handle carefully and stow securely. Should be stowed in a 'tween-decks space and relatively near the top so that no great weight will rest on the containers. Also, should be well blocked off, as with light case goods, to prevent movement when the vessel rolls.

Ebony.—A heavy, hard, black wood obtained chiefly from trees growing in Ceylon, Madagascar, Mauritius, the East and West Indies, and used in cabinet and instrument making. It is frequently shipped in bags containing pieces 4 to 6 feet in length and weighing 50 to 75 pounds each. Ebony is comparatively valuable and should be carefully tallied in and out and given special attention to prevent theft.

Egg albumen.—See Albumen.

Eggs.—Eggs are readily damaged by taint and so should not be stowed near odorous cargo or such goods as newly sawn timber, spices, potatoes, or other fruits or vegetables that may decompose and heat or give off odors. Egg cases should be handled carefully and should be stowed on the flat, never on edge. Shipments of eggs are made from the East Indian Coast to Burma, packed in large earthenware jars, each jar containing from 500 to 1,000 eggs, usually packed in lime. These must be handled with especial care as they will break very easily.

Eggs shipped from China and Egypt, in considerable quantities, are usually packed in light cases or crates. The use of refrigerated space for long voyages is increasing and this is resulting in far better carriage.

Eggs, desiccated.—Shipped in cases, chiefly from China. Stow in refrigerated space or in a cool place away from odorous cargo.

Egg-yolk liquid.—Shipped chiefly from China, packed in tins in cases. Should be treated as wet cargo. See Refrigerated Cargo.

Egg-yolk powder.—Shipped from China and is dry cargo. If not carried in refrigerated space, stow in a cool place away from odorous goods.

Egyptian privet.—See Henna.

Electric bulbs.—These are well packed, but should be given special care in handling and stowage. They should not be stowed among heavy cargo, but given top stowage, either entirely alone or with other light goods.

Electrolyte (acid) battery fluid.—Corrosive. See Dangerous Goods.

Elemi.—A fragrant resin obtained from various widely distributed tropical trees and used in manufacturing printer's inks, varnishes, etc.

Like other resins, it is a dry, clean cargo, but will melt if heated. Stow in a cool place well away from moist or oily goods.

Emery ore.—A dark granular stone used for abrasive purposes. It is shipped chiefly from Turkey and Greece, in bulk, bags, kegs, and barrels, and does not require any special stowage.

Enamelware.—Many enameled products, such as electric refrigerators, bath tubs, and sinks, are shipped in large quantities. These are relatively valuable goods and every care should be taken to prevent chipping or otherwise damaging the enamel. The use of hooks on plywood cases containing these articles should be absolutely forbidden, as much damage has arisen from this cause. In stowing, care must be taken that pressure does not distort the packages, otherwise the contents are likely to be chipped and damaged.

Eradicators (ink, paint, and grease).—Some of these are inflammable or combustible liquids. See Dangerous Goods.

Esparto grass.—A wiry grass grown in North Africa and southern Europe and used in the manufacture of paper, rope, etc. It is packed in bales that stow from 90 to 115 cubic feet per ton, and is frequently carried in full cargo lots. Esparto grass is said to be liable to spontaneous combustion, and precautions should be taken to guard it against fire hazards during loading, discharging, and throughout the voyage. The grass loses weight during the course of a long voyage and bills of lading usually protect the vessel against this contingency.

Because of its light weight a deck load is usually carried when a full cargo is taken. The deck load should be well secured and covered with tarpaulins to protect the grass. The deck should be well dunnaged and the tarpaulins carried down the side of the deck load and tucked in between the lower tier of bales and the dunnage.

Esparto pulp.—The pulp made from esparto grass, and shipped largely from France. Ordinarily dry stowage.

Essential oils.—A large number of essential oils are shipped from different countries, sometimes in drums, and sometimes in smaller containers, such as tins or cases. Since these oils are volatile, they possess a certain ability to cause ignition of organic or finely divided material, such as cotton, waste, textiles, sawdust, and charcoal, when mixed with same. They should not be stowed with cotton, solvents, textiles, or similar materials or with foodstuffs. The principal essential oils are:

Almond.
Aniseed.
Apricot.
Attar of roses.
Bay.
Bergamot.
Birch tar.
Bois de rose.
Cajeput.
Camphor.
Cananga.
Caraway.
Cardamon.
Cassia.
Cedar.
Celery.
Cinnamon.
Citronella.
Clove.
Copaiba.
Coriander.
Croton.
Cubeb.
Cumin.
Dill.
Eucalyptus.
Fennel.
Geranium.
Ginger.
Grapefruit.
Juniper.
Lavender.
Lemon.
Lemon grass.
Lime.
Linaloe.
Mace.
Mandarin.
Marjoram.
Mustard.
Neroli.
Nutmeg.
Orange.
Origanum.
Parsely.
Patchouli.
Pennyroyal.
Peppermint.
Petitgrain.
Pimento.
Pine needle.
Pine pumilionis.
Pine sylvestris.
Rose.
Rosemary.
Rue.
Sapol.
Sage.
Sandalwood.
Sassafras.
Savin
Spearmint.
Spike.
Spruce.
Tansy.
Thyme.
Valerian.
Vetiver.
Wintergreen.
Ylang-ylang.

The oils listed above are all of vegetable origin and each possesses in a concentrated form the odor characteristic of the plant from which it is obtained. They have pungent smells and should be stowed well away from such articles as tea, tobacco, and foodstuffs. A frequent practice is to stow these oils in peaks where they will be isolated and where possible tainting or leakage damage to other cargo is entirely eliminated. The peaks should be well dunnaged and ventilated. It is recommended that dunnage used for essential oils should be disposed of following discharge to prevent possible damage to foodstuffs, or other cargo carried on the next voyage.

Ethane.—An inflammable gas. See Dangerous Goods.

Ether, diethyl and ethyl.—Inflammable liquids. See Dangerous Goods.

Ether, sulfuric.—An inflammable liquid. See Dangerous Goods.

Ethyl acetate.—An inflammable gas. See Dangerous Goods.

Ethyl aldehyde (acetaldehyde).—An inflammable liquid. See Dangerous Goods.

Ethyl benzene.—Combustible. See Dangerous Goods.

Ethyl bromide.—An inflammable liquid. See Dangerous Goods.

Ethyl butyl acetate.—A combustible liquid. See Dangerous Goods.

Ethyl butyrate.—A combustible liquid. See Dangerous Goods.

Ethyl chloroacetate.—A combustible liquid. See Dangerous Goods.

Ethyl chloride.—An inflammable liquid. See Dangerous Goods.

Ethyl hexaldehyde.—A combustible liquid. See Dangerous Goods.

Ethyl lactate.—A combustible liquid. See Dangerous Goods.

Ethyl methyl ketone.—An inflammable liquid. See Dangerous Goods.

Ethyl nitrate (nitric ether).—An inflammable liquid. See Dangerous Goods.

Ethyl nitrite (nitrous ether).—An inflammable liquid. See Dangerous Goods.

Ethyl silicate.—A combustible liquid. See Dangerous Goods.

Ethylene.—An inflammable gas. See Dangerous Goods.

Ethylene dichloride.—An inflammable liquid. See Dangerous Goods.

Ethylene oxide.—An inflammable liquid. See Dangerous Goods.

Eucalyptus leaves.—The leaves of the eucalyptus tree from which the oil is extracted. Shipped in bags chiefly from Spain and Australia. See Leaves.

Eucalyptus oil.—Also known as kayu putch and white wood oil in eastern ports. A resinous oil obtained from the leaves of Australian blue gum tree and used in perfumery, antiseptics, and toilet preparations. It is not as valuable as most essential oils, but because of its pungent smell it should be given the same type of stowage.

Eulachon (Oolakan) oil.—The oil obtained from the oolakan fish, found chiefly in the rivers of the Canadian Pacific coast. See Fish oils.

Euphorbium.—A yellowish gum resin, shipped from East Africa and Morocco and used in medicines. Stowage as for gums.

Excelsior.—A hazardous article. See Dangerous Goods. Protect from sparks or open flame. Reject wet or insecurely packed consignments.

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Explosives.—See Dangerous Goods.

Extracts, liquid flavoring.—These usually consist of alcoholic solutions and many of them are inflammable or combustible liquids. See Dangerous Goods.

Farina.—A starchy product used in making dextrine, for stiffening fabrics, and for food. Usually packed in bags, boxes, or barrels, which should be stowed in a cool dry place away from odorous or wet goods.

Fats, vegetable.—Vegetable fats are shipped in important quantities for use in the manufacture of soaps, candles, etc. They are usually packed in drums or casks which should be carefully inspected, since a faulty container would permit leakage during the voyage. They should be stowed in as cool a place as possible and away from cargo that might be damaged by leakage. The more important products of this class are:

Avocado oil.
Bayberry oil.
Carapa oil (orba-wood).
Chinese vegetable-tallow.
Cacao butter.
Coconut oil.
Ghee butter.
Macassar oil.
Mahwa butter.
Oil of mace (nutmeg).
Palm oil.
Palm-seed oil.
Piney tallow.
Shea butter.

Fava beans.—A dried bean used as a foodstuff and for stock feed. Shipped in bags chiefly from Argentina. Stowage as for beans.

Feathers.—The commoner types of feathers, such as duck and goose, used for upholstery, bedding, etc., which are shipped chiefly from China and the Soviet Union in bales or sacks, require no special stowage, but should be kept away from articles of an oily nature. If clean and no odor, may be stowed with general cargo; otherwise separate stowage. Do not stow near tea.

Valuable feathers such as ostrich, peacock, bird of paradise, argus pheasant, egret, white heron, and adjutant, are usually packed in wooden boxes which are sometimes sealed or sewn in coverings. These should be stowed as valuable cargo in the ship's strong room or special cargo locker and given special protection against pilferage.

Feeds, wet mixed (prepared animal feeds).—Some of these may cause spontaneous heating and possible ignition, and must be stowed away from heat in a cool, dry, well-ventilated compartment. Classed as hazardous articles. See Dangerous Goods.

Felt.—A cloth made of wool, hair, and the like, heated, rolled, and pressed. Many varieties are shipped, such as fine felt for hats, roofing felt, etc. Should be given ordinary dry stowage. Do not confuse with inodorous felt, which is a dangerous cargo.

Felt, inodorous.—This product, made from flax, jute, or some similar material treated with rosin and oils, is liable to spontaneous combustion. It is frequently carried on deck. If stowed below it should be in a cool place near the hatch where it is readily accessible.

Fennel seed.—Aromatic seeds which yield a volatile oil (amise camphor) used for medicinal purposes, in the manufacture of cordials, etc., and shipped in bags chiefly from North Africa, Mediterranean ports, and India. See Seeds.

Fennel-seed oil.—Obtained from fennel seeds. See Essential oils.

Ferrosilicon.—A hazardous article. See Dangerous Goods.

The Board of Underwriters of New York has issued a rule for the stowage of ferrosilicon, which reads as follows:

A. Ferrosilicon in good barrels, drums, or cases, containing not more than 15 percent or not less than 80 percent of silicon may be carried under deck away from crews' quarters in a well-ventilated hold.

B. Ferrosilicon in good barrels, drums, or cases, produced in electric furnaces and containing not more than 30 percent and not less than 70 percent may be carried under deck away from crews' quarters in a well-ventilated hold.

Each consignment of ferrosilicon must be accompanied by a certificate from the maker or shipper stating the percentage of silicon it contains, and each package marked with the words "Ferro Silicon."

All consignments of Ferrosilicon must have been exposed to the air at least ten (10) days before shipment.

Fenugreek (methie seed).—These seeds yield a yellow dye and are used medicinally and in the manufacture of perfumery. Shipped in considerable quantities chiefly from India, Egypt, and Morocco. See Seeds.

Ferric arsenate.—A poisonous article. See Dangerous Goods.

Ferric arsenite.—A poisonous article. See Dangerous Goods.

Ferrophosphorus.—A hazardous article. See Dangerous Goods.

Ferrous arsenate.—A poisonous article. See Dangerous Goods.

Fertilizers, tankage.—A dried and ground product of garbage, consisting principally of vegetable fibers. Is subject to spontaneous heating and ignition and has an offensive odor. Classed as a hazardous article. See Dangerous Goods.

Fibers.—The principal fibers shipped in international commerce, all of which are dealt with under their particular name in this section, are:

Asbestos.	Coir.	Horn.	Raffia.
Bristles.	Cotton.	Istle.	Ramie.
China grass.	Flax.	Jute.	Rhea.
Coconut.	Hemp.	Kapok.	Rice.

Some fibers, as flax, hemp, istle, and jute, may be subject to spontaneous heating and possibly fire. Great care must be exercised to prevent streaks of flame from coming in contact with them and they must be stowed well away from vegetable and animal oils. These fibers are classed as hazardous articles. See Dangerous Goods.

Figs.—Shipped in boxes, bundles, bags, and baskets chiefly from Smyrna and Lisbon. Should be kept away from odorous cargo, and should not be stowed on top of dry cargo unless inspection has shown that the figs are thoroughly dried, otherwise there is danger of leakage.

Filberts.—Shipped from Turkey, Italy, Spain, France, and elsewhere. See Nuts.

Films.—Motion-picture films, photographic films, and X-ray films are inflammable and are classed as dangerous goods. See Dangerous Goods.

Fir-needle oil.—An essential oil shipped chiefly from the Soviet Union. See Essential oils.

Fireworks.—Many types of fireworks are classed as dangerous explosives. See Dangerous Goods. They are shipped not only from United States ports, but in considerable quantities from Shanghai, Hong Kong, and other Far Eastern ports. The latter are usually packed in very light cases covered with matting, and these should not be stowed beneath heavy goods. If possible, should be stowed on top

of all other cargo or used as beam filling, but *not* as broken stowage. Firecrackers are classed as "Dangerous Material, first category," by the Suez Canal Authorities, whose regulations impose severe restrictions on vessels carrying first and third category goods in the same hold. See Suez Canal Regulations in section, "Dangerous Goods," chapter IX.

Fish oils.—There are a number of fish oils, including: Herring oil, shipped in barrels and in bulk principally from North Japan and Eastern Siberia; seal oil, shipped chiefly from Newfoundland and Greenland; and sperm oil, whale oil, menhaden oil, etc. All are odorous and usually possess high flash points. If they leak on sawdust, vegetable fibers, or other organic materials, there is danger of spontaneous heating and ignition. They are classed as hazardous articles. See Dangerous Goods.

Fish scrap (*fish meal*).—Ground and dried fish residue. Subject to spontaneous heating and ignition. Offensive odor; will contaminate fine foodstuffs. Classed as a hazardous article. See Dangerous Goods.

The Board of Underwriters of New York states that:

Fish meal or fish scrap containing not less than 8 percent and not more than 12 percent moisture or having a temperature exceeding 100 degrees F. when loaded may be stowed in a poop, bridge deck, forecastle, or in a 'tween deck away from the hatch square in which the meal is loading. Dunnage should be plentifully laid between tiers to allow circulation of air, no beam fillers to prevent direct ventilation to the ventilators and the hatch coamings should have air space in holds or decks.

Fish meal or scrap may be stowed in a hold or deep tank providing these spaces have good ventilation, ventilators to be over one foot or more in diameter for direct ventilation. The hold and/or deep tank must have dunnage 5 inches high spaced a foot apart laid fore and aft on the skin of the hold with thwartship dunnage laid on top. Where a deep tank which may contain an oil settling tank is separated from a boiler room by one steel bulkhead, fish meal should be stowed not less than 4 feet from this steel bulkhead and settling tank.

At every 5 feet up in stowage two air ducts of 5-inch dunnage laid athwartship in line with the fore and aft hatch coamings with two other air ducts laid fore and aft in line with the hatch coamings, both air duct lines to extend from wing to wing and bulkhead to bulkhead to join up with 4 perpendicular air ducts to the coamings.

If the hatch coamings have quarter columns, these columns can be used as air ducts providing the bags are stowed away from the columns at least one foot.

No beam fillings are allowed and the ducts and spaces so laid that there will be a continuous circulation of air under, round, and through the cargo. No bags are to be stowed within one foot of any bulkhead fore or aft, 'tween deck included. Ducts can be constructed of 2 pieces of 5- or 6-inch wide dunnage on edge with a 5- or 6-inch strip nailed every 2 feet apart on both edges, making a square. Any hatch over 20 feet in length should have an extra air duct laid in the center, especially that part of the hatch square where the bags are landed during loading. This applies to lower hold and deep tank; if 'tween deck hatch stowage is desired an air duct is required in this space.

Wet acidulated fish meal or fish scrap containing moisture over 40 percent must be so stowed that other cargo will not be affected by odor or dampness.

Fitch skins.—The skins of the polecat or fitchew; a fur skin. Shipped in bales chiefly from the Soviet Union. See Furs, also Skins.

Flax.—The fiber from which linen is made. Shipped from many areas, including Argentina, U. S. S. R., Australia, New Zealand, India, and Italy. The size and weight of bales vary considerably

for different countries and ports, but generally average from 400 to 450 pounds per bale. The stowage factor varies greatly, according to the density with which the bale is packed. Should be well-dunnaged and ventilated and kept apart from wool, copra, and other articles of an oily nature to protect against heating. If shipped in a damp condition, flax is especially liable to heat. See Dangerous Goods.

Flaxseed (*linseed*).—The seed of the flax plant, from which linseed oil is obtained. See Linseed, also Seeds.

Flaxseed oil.—See Linseed oil.

Fleaseed (*fleawort*).—See Psyllium seed.

Flour.—Flour is subject to damage by tainting and from moisture. It should, therefore, be stowed well away from any odorous goods, such as tar or turpentine, and also away from wet or oily goods that may heat and throw off moisture. It should never be stowed on or with newly sawn lumber nor over corn or other cargoes likely to heat and give off moisture. Large claims have arisen from these types of stowage, and also from stowing flour in the same hold with fresh apples, flour being readily damaged by apple taint.

Flour in bags should be well-dunnaged and kept from contact with metal parts, such as stanchions or bulkheads, by the use of mats. Flour in barrels should not be stowed in excess of 8 heights; the lower tiers should be well bedded, and only light cargo should be stowed on top.

The Board of Underwriters of New York has issued the following:

RULES FOR VESSELS LOADING FLOUR OUT OF UNITED STATES GULF PORTS

1. Steamer's holds and compartments in which flour is to be loaded should be inspected for cleanliness. Surveyor should also promptly ascertain from the Master and/or his Agents whether a certificate of inspection has been obtained from the United States Department of Agriculture as to cleanliness and freedom from insect infestation. If such a certificate has been obtained, the following clause should be stamped across the face of the Board's certificate.

The Board's surveyor at * * * was advised by the Master and/or his Agents that a certificate of cleanliness applicable to this voyage has been obtained from the United States Department of Agriculture prior to the steamer's loading flour in number * * * hold.

If no such certificate has been obtained from the United States Department of Agriculture then the following clause should be stamped across the face of the Board's certificate.

The Board's surveyor at * * * was advised by the Master and/or his Agents that no certificate of cleanliness applicable to this voyage has been obtained from the United States Department of Agriculture prior to the steamer's loading flour in number * * * hold.

2. Flour must be dunnaged and protected from all liability of stain or sweat.

3. Flour out of Gulf Ports should not be carried in the same compartment with oilcake or cottonseed meal, due to the risk of insect infestation, but may be carried in the same hold provided a steel deck, good hatches, and a good tarpaulin separates these commodities.

4. Care should be taken that flour is not stowed in a hold or compartment where it is liable to taint from odorous cargo and that all compartments carrying flour are clear of odors before loading. Ventilators running through compartments in which flour is stowed should be safeguarded to the satisfaction of the surveyor to prevent the transmission of taint, odors, or infestation.

5. Surveyor should observe that the methods of loading flour are such that no damage is being done by negligence or careless handling.

Fluorine.—Obtained from fluorspar and used in the manufacture of glass. Is usually packed in cases and should be given ordinary dry stowage.

Fluorspar (*fluorite*).—A mineral compound of calcium and fluorine used in the manufacture of glass, hydrofluoric acid, etc. Shipped from China, Mexico, and elsewhere, packed in baskets, matting, bags, and in solid blocks. Should be given ordinary dry stowage, but care should be taken to prevent damage to other goods through siftage of the dust.

Foodstuffs.—Many foodstuffs are liable to serious damage from tainting and also from moisture. Delicate foodstuffs should therefore be stowed well away from odorous cargo and also from moist or oily goods which may heat and throw off moisture. They should not be stowed near newly sawn lumber.

Footwear.—Requires no special stowage, but every precaution must be taken to guard against pilferage, since boots and shoes are one of the articles most frequently sought by experienced pilferers.

Formaldehyde (*formalin*).—A combustible liquid with a pungent, suffocating odor. Must be stowed away from foodstuffs and other delicate cargo. See Dangerous Goods.

Formic acid, corrosive.—See Dangerous Goods.

Foundry facings.—Finely pulverized bituminous coal, subject to heating and ignition. Stow well away from sources of artificial heat; do not overstow.

Fox skins.—Shipped in bales from the Soviet Union, Scandinavia, and elsewhere. See Furs.

Frankincense.—An aromatic gum or resin used as an incense. A valuable cargo that should be carefully tallied and watched and stowed in the ship's strong room or special cargo locker.

Frozen meat.—See Refrigerated Cargoes, chapter IX.

Fruit, fresh.—See Refrigerated Cargoes, chapter IX.

Fuel oils.—A term employed broadly to describe any petroleum product used for the production of heat or power, ranging from the distillate series, down to and including any product which can be made liquid by steam heat. Flashpoint is variable, but many are combustible liquids. See Dangerous Goods.

Fuel, patent.—See Briquets.

Fuller's earth.—A claylike substance used in fulling or thickening cloth. Shipped in bags, barrels, and boxes. Requires no special stowage, but must be kept dry. When packed in bags and stowed above other cargo, such as timber, separation cloths should be laid beneath it, as if the earth mixes with timber it will later damage the machinery used for dressing the wood, and claims will result.

Fulminate of mercury.—A dangerous explosive. See Dangerous Goods.

Furfural.—A combustible liquid that will contaminate foodstuffs. See Dangerous Goods.

Furniture.—Usually packed in cases or crates which should be given good dry stowage. Special care should be taken not to stow heavy weights over furniture.

Furs.—Valuable furs should be stowed in the ship's strong room or special cargo locker, which should be ratproof.

Among the more valuable furs are:

Badger.	Marten.	Polecat.	Squirrel.
Bear.	Mink.	Raccoon.	Weasel.
Chinchilla.	Muskrat.	Sable.	
Ermine.	Nutria.	Seal.	
Fox.	Otter.	Skunk.	

These furs are packed in bales or sometimes in tin-lined boxes, and are shipped chiefly from U. S. S. R., China, and Canada.

The cheaper furs, such as rabbit, cat, and the skins of certain types of dogs, are usually baled. All furs should be well ventilated during the voyage, and should be stowed away from wet goods and from cargo that is likely to be damaged by the odor of the skins. Stowage should be arranged to prevent damage to bales from chafing or damage by contact with iron, etc. See also Skins.

Fusees, railway.—Explosives. See Dangerous Goods.

Fusel oil.—A combustible liquid. See Dangerous Goods.

Fustic.—A yellow dyewood shipped chiefly from Jamaica, Mexico, Costa Rica, and Nicaragua. It is very crooked and is shipped in 3- to 6-foot lengths, which makes it useful for broken stowage.

Fuzes.—Some fuzes are classed as dangerous explosives. See Dangerous Goods.

Galangal.—The root of an Asiatic plant, somewhat like ginger. It is usually carried in bags and requires good dry stowage.

Galban (galbanum).—See Gums.

Galena (lead ore).—This is shipped in bulk from Spain, and in bags from China, and elsewhere. See Ores, in chapter IX.

Gallnuts or galls.—These so-called "nuts" are abnormal growths caused by punctures made by insects in the leaves of a variety of oak found chiefly in Turkey, Syria, and China. They have a high tannin content and are used in tanning and for the manufacture of tannic acid, medicine, inks, and mordants. Shipped in bags and boxes. They are clean, dry goods and may be stowed among other cargo, but are likely to heat and consequently require good ventilation during the voyage.

Gallnut extract.—Shipped in boxes, sometimes tin-lined. Should be stowed in a cool place.

Galvanized iron.—This is iron coated with zinc and is most commonly shipped in the form of sheets. It should not be worked during rain and care must be taken not to damage the zinc coating, for if it is injured the iron will rust, particularly if it is exposed to moisture and varying temperatures.

Gambier (terra Japonica).—An extract obtained from the leaves of certain East Indian plants and used in tanning and dyeing. In extract form gambier appears like brown or yellow earth, and since it reached Europe via Japan, it became known as terra Japonica or "Japanese earth." It is usually prepared in the form of small cubes, but is sometimes in the form of large blocks, also disks and long sticks. Packed in bales, boxes, or baskets. Gambier should not be stowed against any commodity except jelatong, nor over any cargo except coal. In hot weather it drains heavily, giving off a thick sirupy fluid, and when the vessel enters a colder climate it sets very hard and the packages stick to the deck, bulkheads, and other parts of the hold with which they are in contact.

Gambier should be stowed on a bedding of 2 to 3 inches of sawdust and each tier should be covered with 1 inch or more of sawdust. Stowage in the bridge space, poop, or shelter-deck space is preferable. If in the shelter deck, it is recommended that wooden bulkheads should be erected to protect adjacent cargo from the drainage, odor, and moisture given off by the gambier. Such bulkheads should be

airtight and their lower sections should be cemented to make them watertight.

No dry or delicate cargo should be stowed in the same compartment with gambier or in a compartment connected by ventilators with the one in which gambier is stowed. If possible, no other cargo should be stowed over gambier, but if this cannot be avoided, the gambier should be well boarded over and matted to prevent the top cargo from sinking down into the heated gambier. Cutch may be used for overstowing gambier, since it is of the same character, but overstowing should be avoided if at all possible.

Compartments containing gambier should be kept well ventilated throughout the voyage, and it is recommended that hatch covers be removed for this purpose whenever possible.

Gamboge.—A gum resin obtained from trees growing chiefly in India, Ceylon, Siam, and Cochinchina, and used to make a yellow water-color pigment. It is usually shipped in wooden boxes which contain the gum in the form of lumps and in the form of small cylindrical sticks called "pipe gamboge," formed by the liquid being collected in lengths of bamboo cane. Gamboge is a poison. It should be stowed in a cool place away from foodstuffs.

Gambree.—A variation of gambier.

Ganja.—A preparation made from the hemp plant and used in the Far East as a narcotic and as tobacco. Shipped in small quantities in bundles.

Garancine.—A dyestuff made by treating madder with sulfuric acid. Stow away from foodstuffs and articles liable to damage by leakage.

Garbage tankage (tankage fertilizers).—See Fertilizers, tankage.

Garbanzos.—See Chick peas.

Garlic.—Has a strong smell and a pungent taste. Shipped principally from Mexico, and Portugal. Perishable cargo. Should be well ventilated to prevent deterioration. See Onions.

Gas drips, hydrocarbon.—Liquid condensate of gas. Disagreeable odor and will contaminate foodstuffs. An inflammable liquid. See Dangerous Goods.

Gas identification sets.—These sets frequently contain poisonous liquids and gases and consequently are classed as poisonous articles. See Dangerous Goods.

Gases (compressed gases).—See Dangerous Goods.

Gasoline.—An inflammable liquid. See Dangerous Goods, also Petroleum Products, in chapter on Stowage of Special Cargoes.

Gentian root.—A dried root used medicinally. Shipped chiefly from Spain, Yugoslavia, France, and Belgium. It is usually packed in bags or bales, and should be given ordinary dry stowage, away from moist, oily, or odorous cargo.

Geranium oil.—An essential oil, shipped chiefly from U. S. S. R., Algeria, East Africa, and United Kingdom. See Essential oils.

Ghee (ghi).—A butter prepared chiefly from buffalo milk and used in the East by Mohammedans in place of lard which their religion forbids them to employ. Usually packed in second-hand casks and kerosene oil tins. It should be regarded as wet cargo liable to leakage and should be stowed away from scented or odorous goods to keep it from being tainted.

Gin.—See Alcoholic Liquors, in chapter IX.

Gingelly (*sesame*).—The seeds of a plant cultivated in India, China, Japan, Asia Minor, and elsewhere, from which an oil is extracted for use in soap making, and cooking. See Seeds.

Ginger.—The root of a plant grown chiefly in the East and West Indies, China, and India. It is shipped in single and double bags and requires no special stowage. It is frequently used as broken stowage with clean dry cargoes.

Ginger, preserved.—The ginger root preserved in sirup and packed in jars. Special care should be taken to stow cases containing these jars with the marks uppermost, or the sirup is likely to leak out and damage other cargo. Should also be protected against pilferage.

Ginseng.—The root of a plant grown chiefly in North China, Manchuria, and Canada, and valued by the Chinese as a medicine. It is usually packed in the East in shallow oblong baskets, which should be given good dry stowage, away from oily, moist, or odorous goods. It should also be protected against pilferage by native longshoremen and others.

Glass (*sheet or plate*).—Requires very careful handling. Crates and cases of plate glass should be stowed on edge and athwartship, preferably in a 'tween-deck. They should be stowed on the deck, with the properly marked side uppermost, and with no dunnage, since the case should be supported along its entire length and dunnage might interfere with this arrangement. Cases of ordinary window glass, it is stated, will stow satisfactorily fore and aft, if such stowage is necessary. It is best to stow cases of glass in the square of the hatch so handling to the wings will be avoided. Such cases should never be stowed on top of bagged goods or other cargo that is likely to settle. They should be well chocked off and all broken stowage spaces surrounding them should be filled with suitable goods in order to minimize movement of the cases caused by the movements of the vessel.

Glucose.—A sirup derived from corn and other vegetable products. It is usually shipped in barrels, sometimes in cases. There is some danger of leakage from barrels, particularly if subjected to heat which causes the glucose to thin out.

Gluestock.—A substance obtained by boiling the hoofs and other parts of animals, and shipped in both liquid and dry condition in barrels, drums, bales (glue pieces), and cases. If carried as a liquid it should be given good stowage in a cool, well-ventilated place, the poop, bridge space, or square of the hatch being commonly used. If not kept dry, glue is likely to putrefy and give off odors that will taint nearby goods. Glue pieces are said to be liable to spontaneous combustion, and several fires on vessels have been attributed to this product. Consequently, glue pieces should be stowed away from heated surfaces, in a well-ventilated place which is readily accessible.

Glycerin.—This is usually shipped in drums which should be treated as wet cargo and not stowed with dry goods.

Goat hair.—Shipped in bales chiefly from U. S. S. R. See Hair, animal.

Goatskins.—Shipped in bales and bundles chiefly from South Africa, Egypt, Morocco, Saudi Arabia, Iran, and Peru. See Skins, also Furs.

Gold, bullion or coins.—See Bullion.

Gold slag.—A heavy metal dross. Dry cargo.

Goora nuts.—See Kola nuts.

Grain.—See chapter entitled "Stowage of Special Cargoes."

Gram.—An Indian pulse, shipped in bags, and used as a cattle feed, etc. See Seeds.

Grapes.—See Fresh Fruit, also Refrigerated Cargoes, in chapter IX.

Graphite.—See Blacklead.

Grass seeds.—These are very fine seeds which are usually shipped in bags, sometimes double or of closely woven material to prevent the seeds from passing through. They should be stowed in a cool, dry place and protected as well as possible from heat and moisture during the voyage.

Greases.—Greases melt if heated and are likely to leak on other cargo. They should be stowed in a cool place away from heated surfaces and should be treated as wet cargo subject to leakage.

Grenades.—Classed as Dangerous Explosives. See Dangerous Goods.

Grindstones.—These are sometimes packed in cases, but are frequently carried loose, when they must be stowed on edge and well blocked off to prevent movement. They should be given careful handling at all times to prevent breakage or chipping.

Ground nuts (peanuts, monkey nuts, earth nuts).—Shipped in large quantities chiefly from India and West Africa, in both the shelled and unshelled state, but principally the former. When carried in bags and the nuts are shelled and dry, they may be stowed with dry cargo. Care should be taken when loading shelled nuts to prevent bruising of the cargo through slings striking the hatch coamings, etc., as serious damage has frequently been caused as a result of the bruised nuts heating and bags being scorched. Bagged nuts should be stowed in a cool, well-ventilated place, away from wet or moist cargo or goods that is liable to heat.

When shipped in bulk, the nuts should be given ample surface ventilation, as the nuts readily become heated when new, particularly if loaded in May or June at West African ports after heavy rain. Nuts that have been exposed to the rain should never be stowed near the boiler or engine room, as many fires have been caused by such stowage.

Groundnut oil.—See Arachis oil.

Guanaquito skins.—The skins of a fur-bearing animal found in Argentina, Brazil, and Chile. See Furs, also Skins.

Guano.—A valuable manure collected from islands off the coasts of Peru and Chile, also shipped from South Africa, Argentina, Mexico, Cuba, and elsewhere. It should never be stowed in the same compartment with foodstuffs, and some authorities recommend that it should not even be carried in the same vessel with foodstuffs or other delicate goods. Guano must be kept apart from nitrate of soda, which is shipped from the same South American ports, and it must be protected against contact with salt water. Rain water, however, does not injure guano.

Guanyl nitrosamino guanyl tetrazene.—A dangerous explosive. See Dangerous Goods.

Guanyl nitrosamino guanylidene hydrazine.—A dangerous explosive. See Dangerous Goods.

Guayule.—The sap of an herb of the aster family, used as a substitute for rubber, and shipped chiefly from Mexico. See Rubber.

Guiac.—See Gums.

Ginea corn (*durra*).—Stowage as for seeds.

Gums.—A large number of gums are carried in ocean commerce and are used in the manufacture of varnish, adhesives, etc., and as stiffening for textile fabrics. They are all inflammable and should be stowed with this in mind.

Gums are packed in bags, cases, baskets, chests, and various other containers. They are clean, dry cargo, but will melt if heated. They should therefore be stowed in a cool place, well away from moist or oily goods or cargo likely to damage them by taint, also from cargo liable to heat or spontaneous combustion. (A list of the principal gums of commerce follows.)

Gum arabic (*acacia gum*).—Shipped chiefly from Egypt, Senegal, and Arabia.

Gum benjamin (*benzoin.*)—Shipped from Singapore, Netherlands Indies, French Indochina, and Thailand.

Gum camphor.—Obtained from a tree that grows in Japan, China, Borneo, and Ceylon.

Gum churrah.—A resin extracted from the hemp plant and shipped in small quantities.

Gum copal.—A hard resin obtained chiefly from trees growing in East Africa, Zanzibar, Madagascar, and South America. Used in making varnishes.

Gum dammar.—A resin obtained from several East Indian trees and used in making varnishes. Shipped chiefly from British Malaya, Netherlands Indies, and the Philippine Islands.

Gum dragon's blood.—A resin obtained from some species of rattan palms found chiefly in Sumatra and Borneo and largely used as a red stain in coloring varnishes. It is usually shipped in cases, although the highest grades are sometimes shipped in the form of cylindrical rolls wrapped in palm leaves.

Gum galban or galbanum.—A gum used medicinally and in making varnish. It is usually shipped in bags, and is exported from Iran and India.

Gum guiac (*guaiac*).—A resin with a balsamic odor obtained from the guiac tree and used medicinally. Shipped chiefly from Dominican Republic.

Gum karaya.—A gum obtained from several East Indian trees and used as a substitute for gum tragacanth.

Gum kauri.—Shipped from New Zealand, in bags and cases, and used in making varnishes.

Gum kutira.—A gum obtained from several East Indian trees and used as a substitute for gum tragacanth.

Gum mastic.—A resin obtained from the lentisk or mastic tree and used in the manufacture of varnishes. Shipped chiefly from Greece and Syria.

Gum myrrh.—A gum resin obtained from trees found chiefly in Arabia, Ethiopia, and British East Africa. It is usually shipped in cases, and is used in medicine and in the manufacture of incense and perfumes.

Gum olibanum.—A gum resin used medicinally and for making incense. Shipped from Somaliland via Aden, and in small quantities from India.

Gum sandarac.—A pale yellow gum resin that exudes from the sandarac tree of the Atlas Mountains in North Africa. It is shipped from Moroccan ports, usually in barrels, and is used in making varnishes and polishes.

Gum senegal.—Derived chiefly from a Central African tree, the *Acacia senegal.*

Gum talki.—A form of gum arabic obtained in the Blue Nile region of the Anglo-Egyptian Sudan.

Gum tragacanth.—Shipped chiefly from Smyrna, U. S. S. R., India, Iran, Iraq, and Turkey, usually in the form of dry flakes. It is used in pharmacy for making pills, also in calico printing, bookbinding, etc.

Gum tragasol (locust-bean gum).—The gum obtained from the pods of the locust or carob tree.

Guncotton.—See Dangerous Goods.

Gunjah.—A variation of Ganja, which see.

Gunnies.—These are bags made of jute or burlap, which are shipped chiefly from India and Scotland in compressed bales. The word "gunny" is also used to refer to all other types of jute manufactures, such as hessians, rough sacking, etc. Gunnies are clean, dry cargo and require no special stowage, but care should be taken, if they are stowed with other cargo likely to sweat, not to place gunnies under beams or at other spots where condensed moisture might contact the bales. The use of hooks for handling baled gunnies should be strictly forbidden. See also Dangerous Goods, as burlap bags are classed as hazardous cargo.

Gunpowder.—A dangerous explosive. See Dangerous Goods.

Gutta-percha.—A substance resembling rubber, but containing more resin, obtained from several trees found in the Malay Archipelago, Netherlands Indies, and Nigeria. It is chiefly used for insulating electric cables. Has no objectionable qualities. For stowage, see Rubber.

Gutta siak.—A low grade of gutta, somewhat similar to gutta-percha. See Rubber.

Gypsum.—A soft mineral, usually carried in bags, sometimes in barrels and blocks. It requires good, dry stowage and should be stowed away from goods likely to be damaged by moisture.

Hair, animal.—Horsehair, horse-tail hair, badger hair, goat's hair, etc. Shipped largely from China, Japan, Australia, Argentina, Mexico, and U. S. S. R., usually in bales but sometimes in bags and cases. Requires no special stowage, but care must be exercised in handling the unpressed bales since they are frequently poorly covered and there is danger of much of the contents being lost.

Hair, human.—Shipped in cases and bales chiefly from China and Italy. Valuable cargo, and should be stowed in the special-cargo locker. If stowed in a hold, it should be covered with other cargo immediately to prevent pilferage.

Hareskins.—Shipped in bales chiefly from Argentina, U. S. S. R., and Scandinavia. See Skins, also Furs.

Hay.—Usually shipped in bales and classed as a hazardous article. See Dangerous Goods. Do not stow in same hold with corrosive or inflammable liquids. When stowing quantities in one hold, provide vent flues through the stowage to give free circulation of air. Bales with broken bindings should be rejected.

Helium.—A compressed gas. See Dangerous Goods.

Hematite.—The red oxide of iron and an important ore in international commerce. Shipped in bulk. See Ores, in chapter on Stowage of Special Cargoes.

Hemlock bark.—Used in tanning, and shipped in considerable quantities from Canada. See Barks.

Hemp.—Shipped largely from the Philippines, China, and U. S. S. R., packed in bales. Should be loaded in a dry condition and given upper stowage, if possible, well-matted, and dunnaged. Care must be taken to keep hemp from contact with oils or greases, as it is liable to spontaneous combustion if it has contacted these or similar materials. If stowed with wool, as at New Zealand ports, dunnage must be placed between the hemp and wool. See Dangerous Goods.

Hempseed.—Shipped in considerable quantities from China and Japan. See Seeds.

Hempseed oil.—Shipped chiefly from Poland. See Vegetable oils.

Henbane.—A poisonous herb of the nightshade family. Shipped principally from Egypt, U. S. S. R., and Belgium. Dry stowage, away from foodstuffs, and moist, oily, or odorous goods.

Henequen (*sisal hemp*).—The fiber of the maguey or agave, which grows in Haiti, Mexico, and the Central American countries, also in Java, East Africa, and elsewhere. Stowage as for hemp.

Henna leaves (*alhenna, Egyptian privet*).—Dried leaves of the henna plant, used in making dyes, etc., and shipped from India, Egypt, and Iran. See Leaves.

Herbs.—Usually packed in bales or bags. Should be kept perfectly dry during loading and transportation.

Herrings.—Usually salted and packed in barrels or kegs. A wet, odorous cargo that should be stowed well away from dry goods.

Hessians.—A jute cloth woven with double threads, and frequently referred to as burlap or gunnies. Should be given ordinary dry stowage. The use of hooks for handling the bales should be strictly forbidden. See Dangerous Goods, as this commodity is classed as hazardous.

Hides.—These are shipped in both the wet and dry state. Dry hides are usually shipped in bales. They should not be stowed near wet hides as they easily absorb moisture and become soft. Since they are odorous, they should not be stowed with fine or delicate cargo, such as tea, coffee, fruit, and flour. It is generally recommended that bales of hides should be stowed on the flat, especially the ground tier. However, the wing tiers, above the ground tier, should be stowed on edge so that any damage due to chafing, etc., will be confined to the smallest possible number of skins. The bales should be protected by dunnage and matting against contact with metal or any parts on which condensed moisture is likely to collect and make rust marks on the hides.

Dry salted hides, which have had salt rubbed into them, are shipped in barrels and bags, and loose, in folded square bundles. They should be kept as flat as possible and should be protected against contact with metal surfaces that might cause rust damage.

Wet hides, salted or pickled, are shipped in casks, barrels, bales, bundles, and loose. When packed in casks or barrels, they should

be treated as wet and odorous cargo and should be stowed well away from dry goods or foodstuffs that might be injured by moisture or tainting.

Wet hides shipped in bales or bundles or loose must be kept free from contact with metal parts of the ship and from oak timber.

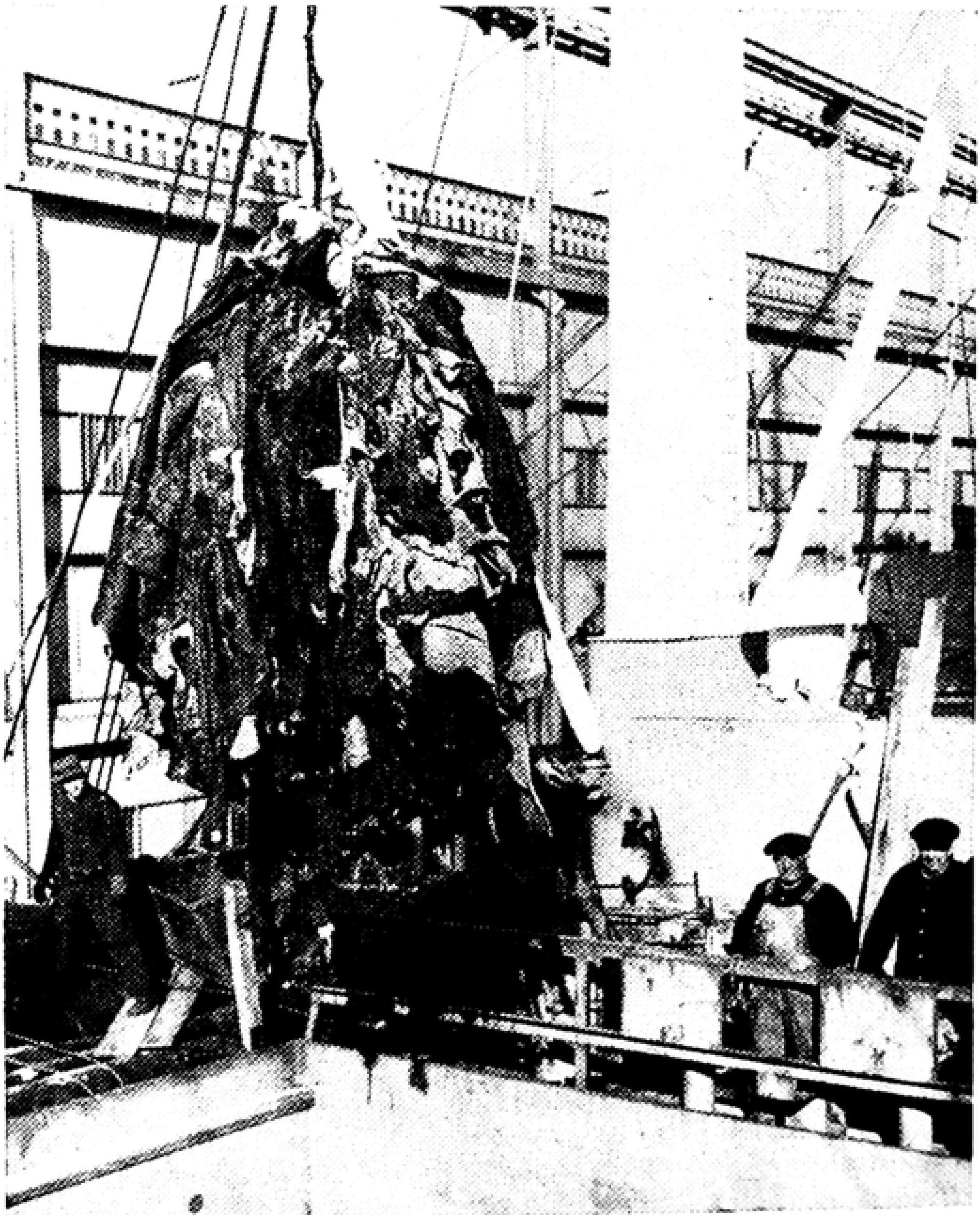

Figure 70.—Wet hides from Argentina being unloaded at New York.

Dunnage wood must be inspected and any pieces made of oak must be eliminated. The use of hooks should be strictly forbidden. (See fig. 70.) Since wet hides will drain heavily, the bilges and strum boxes should be cleaned prior to loading so that the drainage can be properly taken care of. Wet hides require ample ventilation in order to get rid of the moisture and strong odors they throw off

and to prevent deterioration of the hides. Hatch covers should be removed as frequently as conditions permit.

In stowing wet hides shipped loose, they must be laid perfectly flat, with the hairy side up. No hide must be folded or doubled, otherwise it will rot at the fold. Although the hides are wet, they must be carefully protected from rain or sea water.

Loose wet hides, when loaded by themselves in a lower hold or deep tank, are salted into the vessel. The floor of the hold, bulkhead brackets, stringers, etc., should be well covered with wooden dunnage or with horns, if these are shipped for that purpose, and the sides bulkheads, stanchions, ladders, and shaft tunnel should be covered with burlap or mats. Hides with the hair side out are also sometimes used for this purpose.

Each layer of hides is covered with salt and afterwards soused with strong pickle. The pickle is prepared with either salt or fresh water. It is usually prepared in tanks placed on the deck and is projected into the hold or deep tank by means of a hose. Heavy claims have arisen through the use of the wrong type of salt, and ship's officers should make certain that the right grade of salt is being provided. The layers of hides must be maintained level thrughout the hold to prevent the pickle draining off.

Honey.—Shipped in barrels chiefly from the West Indies and Central America. Sometimes packed in tins or jars and shipped in cases. There is danger of leakage, and it should be treated as wet cargo and stowed well away from dry goods.

Hops.—Shipped in bales and bags chiefly from Australia, the Netherlands, and the United States. Should be stowed in a cool, dry place, away from moist goods from which moisture might be absorbed.

Horns.—These are usually shipped loose and are used for broken stowage. They are sometimes packed in bags, in which case no special stowage is required.

Horn tips and shavings.—These are generally shipped in bags and are commonly used as dunnage and for filling broken stowage spaces, They must be kept very dry, since if they get wet they will crack and split when drying and may be rendered useless.

Horsehair.—See Hair, animal.

Horses.—See Livestock, in chapter IX.

Hydriodic acid.—A corrosive liquid. See Dangerous Goods.

Hydrobromic acid.—A corrosive liquid. See Dangerous Goods.

Hydrocarbon gas.—An inflammable gas. See Dangerous Goods.

Hydrochloric acid (*muriatic acid*).—A corrosive liquid. See Dangerous Goods.

Hydrocyanic acid (*prussic acid*).—A poisonous article. See Dangerous Goods.

Hydrofluoric acid (*etching acid*).—A corrosive liquid. See Dangerous Goods.

Hydroflousilicic acid.—A corrosive liquid. See Dangerous Goods.

Hydrogen.—An inflammable gas. See Dangerous Goods.

Hydrogen peroxide.—A corrosive liquid. See Dangerous Goods.

Hydrogen sulfide.—An inflammable gas. See Dangerous Goods.

Illipé nuts.—The fruit of an East Indian tree shipped in bags. Requires no special stowage, but must be well ventilated.

Ilmenite (amang ore).—A mineral from which titanium, used in the manufacture of paint and for hardening steels, is derived. It comes chiefly from the sea beaches of southwestern India and is carried in bulk, except that under certain conditions a quantity is bagged for topping off to prevent shifting of the bulk. See Ores, in chapter IX.

Indigo.—A blue dye prepared from a shrub which grows in India, Java, the Philippines, Guatemala, Egypt, the West Indies, and elsewhere. It is shipped in both powder and paste form. The powder is packed in cases lined with some suitable material or sewn in gunny to prevent siftage, while the paste is usually shipped in kegs or casks. The shrub is sometimes shipped for processing and is packed in bags. Indigo is a valuable cargo and it is recommended that it be stowed in the ship's special cargo locker.

Ink.—Some inks are classed as inflammable or combustible liquids as they contain solvents such as alcohol, acetone, etc. See Dangerous Goods.

Inodorous felt.—See Felt, inodorous.

Insect flowers.—See Pyrethrum.

Insecticides, liquid.—These may be inflammable, semi-inflammable, or poisonous. See Dangerous Goods.

Iodine, crude.—Shipped in kegs from Chile, where it is derived from Chile saltpeter. Should receive locker stowage to prevent damage to other general cargo. Has strong odor and high value.

Ipecac root.—The root of a South and Central American plant, used as an emetic. Shipped in bags chiefly from Costa Rica, Nicaragua, Brazil, and Colombia. Should be given dry, cool stowage, away from moist, oily, and odorous cargo.

Iris root.—See Orris root.

Iron and steel.—For stowage purposes these two materials may be considered together. They are shipped in numerous forms, such as pigs, bars, billets, blooms, rods, plates, sheets, hoops, etc. Pig iron, if in small quantities, should be stowed solid, but large quantities are generally stowed loose in a hold and the weight kept as high as possible. If the vessel has a 'tween deck, a portion of the cargo sufficient to prevent the vessel being too "stiff" should be stowed in the 'tween deck and well secured against shifting.

The weight of cargoes such as pig iron, steel billets, and similar cargoes in the decks of vessels carrying deadweight cargoes should be carefully studied, allowing 300 to 500 pounds to a square foot in 8- to 12-foot decks. Further, if steel is loaded on the shelter or open-weather deck, the weight should not exceed 250 pounds to the square foot, equally distributed. Pig iron averages 25 to 40 pounds in weight and 15 inches to 2 feet in length and is very likely to shift. For this reason the Board of Underwriters of New York has issued the following regulation covering the stowage and securing of pig iron:

> Where a vessel has steel fore and aft bulkheads in the decks, the open spaces between the hatches shall have two 3-inch fore-and-aft lines of shifting boards with the same material for joints at each side of the hatch coamings, or the shifting boards could overlap one foot. Shores of 4 x 6 inches supporting the boards eight feet or less apart, shall be placed on the deck, extending to the vessel's side before loading is commenced, tied with rough dunnage boards to prevent shifting

The same conditions will apply to a vessel with no fore-and-aft steel bulkheads, but two longitudinal fore-and-aft shifting boards of three inches shall divide such deck into three spaces, all well secured and braced from the vessel's side and columns, if any.

The shifting boards shall extend above the ingots and pig iron, and when the cargo is finished loading in the decks, shores of the same material extending to the ship's side and/or columns, shall be securely fastened to the top of the fore-and-aft shifting boards every eight feet.

The average deck would have shifting boards two feet six to three feet high. If the shifting boards in the hatches interfere with the loading, space can be left to place the boards in position after the steel is loaded and the spaces hand filled when complete.

The lower holds shall have one line of shifting boards where no tunnels divide the space. We do not recommend wood uprights as a center line column to secure the shifting boards.

Pig iron in the decks should also be tommed down when loading is completed, with 2- by 10-inch planks laid every 10 feet apart athwartship, and 4- by 4-inch toms placed on top of these planks every 8 feet apart. All toms should be properly cleated on top of the 2- by 10-inch planks and toms well tied fore and aft and athwartship with dunnage to prevent movement, all to be secured with 5- or 6-inch nails.

Blooms and billets are of various sizes, ranging from 2 to 8 inches square, and of various lengths up to 30 feet. Round billets range from 1½ to 3½ inches diameter, 6 feet to 30 feet in length. Steel bars, sheet steel, blooms and billets should be securely braced and shored to prevent movement; cord wood, lumber, wedges, being plentifully used for this purpose. In the decks, dunnage laid not more than 4 feet apart should be used for the steel, the steel being tightly laid. Where there is any irregularity in the tiers, owing to the length of the steel, the spaces should be filled with cord and dunnage wood and the steel wedged off. Each tier should be solid and no open spaces left for movement. Where any steel billets that are stowed on and over the hatches are higher than those laid in the decks, the steel should be shored to the vessel's side helping to reinforce the columns, if any, keeping the steel in place.

All steel in the decks should be tommed down, 2- by 10-inch planks being laid every 10 feet apart athwartship, and 4- by 4-inch toms placed on top of these planks every 8 feet apart. All toms should be properly cleated on top of the 2- by 10-inch planks and the toms properly tied fore and aft and athwartship with dunnage to prevent movement, and secured with 5- or 6-inch nails.

Bar iron should be stowed flat, and care should be taken when loading and discharging to prevent the ends getting bent. Steel hoops are usually shipped in bundles and are likely to damage by bending if stowed beneath heavy cargo. Steel tubes vary in length and may be shipped loose or in bundles. All tubes should be stowed fore and aft and should be well blocked off.

Every precaution must be taken to keep steel dry so as to prevent the formation of rust. In this connection, see chapter VIII, "Damage from Temperature Changes During the Voyage."

The marking of iron and steel articles shipped loose and in bundles, to identify different lots, presents some difficulties, and poor marking frequently causes claims for incorrect delivery. Different lots may be marked with differently colored paints or, better, different lots may be separated by laying strands of old wire or Manila rope over each lot as it is stowed. Before overstowing iron or steel with any

other cargo, it should be well covered with good, dry, flat dunnage. See Pipe.

Iron oxide.—Shipped in barrels and casks chiefly from Spain. Ordinary dry stowage. See Dangerous Goods.

Iron mass (iron sponge).—Metal cuttings or borings, usually associated with a good deal of oil. A hazardous article which may produce sufficient heat to cause fire. Stow away from inflammable liquids, inflammable solids, and oxidizing materials. See Dangerous Goods. The Board of Underwriters of New York reports that it has had serious trouble from spontaneous heating of this commodity and vessels have had to discharge their cargo, owing to excessive heat and spontaneous combustion. They recommend that the oily dust sweepings of iron mass should not be shipped under deck.

Iron ore.—See section on Ores, in "Stowage of Special Cargoes."

Isobutane.—An inflammable gas. See Dangerous Goods.

Isopropanol (ispropyl alcohol).—An inflammable liquid. See Dangerous Goods.

Istle (ixtle) or tampico fiber.—A fiber exported from Mexico and packed in bales. See Fibers.

Ivory.—Usually shipped loose or in bundles. This is valuable cargo and should be carefully tallied in and out. Stow well away from grease, oil, acids, etc., as these will damage ivory. Gentle handling is required to avoid chipping and marking. Scrap ivory is sometimes carried and is packed in bags and casks.

Ivory nuts (tagua or corozo nuts).—The seeds of a South American palm. The inside substance is used as "vegetable ivory." See corozo nuts.

Jabali skins.—A fur skin, shipped in bales from Argentina. See Furs, also Skins.

Jaborandi leaves.—The dried leaves of a tropical American shrub which yields pilocarpin, an alkaloid that is used medicinally. The leaves are usually shipped in bales and are exported from Brazil. See Leaves.

Jackal skins.—These are shipped in considerable quantities principally from Turkey, Iraq, Iran, Syria, and Algeria. See Furs, also skins.

Jaggery.—A very moist sugar derived from the sap of certain types of Indian palm trees. In recent years its shipment in the natural state has declined. When subjected to heat jaggery melts and a thick sirup runs from it. It should not therefore be stowed over any other cargo. If other cargo is to be stowed over jaggery, the latter should be well boarded over and matted. Dry sugar should never be stowed near jaggery without being well separated. Bagged seeds should not be stowed over jaggery, if avoidable, owing to the possibility of mixture, nor should goods subject to damage from moisture be stowed in the vicinity of jaggery.

Jaguar skins.—These are shipped in bales from Brazil and other South American countries. Stowage as for furs.

Jalap root.—The dried root of a Mexican plant which, when dried, yields a medicinal balsam. Usually shipped in bags. Stowage as for barks.

Jamaica pepper.—See Allspice.

Jambul (*jambool*).—A Javanese tree, the bark and seeds of which are used medicinally. Both bark and seeds are shipped. See Barks, also Seeds.

Japan wax.—A hard brittle substance, shipped from Japan, and use as a substitute for beeswax. See Waxes.

Jarrah wood.—A valuable dark-colored hardwood grown in Western Australia, and used for under-water piles, railway ties, etc., owing to the fact that it is unaffected by ants and other insects. Care must be taken when loading and discharging jarrah wood that it is carefully slung, as any pieces falling overboard will sink. When a full cargo of the wood is carried the vessel will be far from full, and it is, therefore, the custom to keep the pieces apart in the lower tiers in order to raise the weight and so make the vessel easier.

Java cotton.—See Kapok.

Jelutong.—A low-grade gutta-purcha used principally in the manufacture of chewing gum and shipped from Malay Archipelago ports. The usual case contains two or more balls which have been rolled up in water. As a result, a great deal of moisture drains from the jelutong and the cases are likely to become rotted during the voyage. It should be treated as wet cargo and should not be stowed near dry or delicate goods, including rubber, which may become moldy if stowed with jelatong. It stows satisfactorily, however, with gambier, which is loaded at the same ports.

Jerked beef.—Beef that has been cut into strips and dried in the sun. It is shipped chiefly from Argentina to Mediterranean ports, and should be given good, dry stowage, well away from oils and other goods which might contaminate it.

Jowaree (*joaree*, *dari*).—A variety of the Indian millet seed. See Seeds.

Juniper berries.—These berries have an odor similar to turpentine and should not be stowed near foodstuffs, such as tea and flour, or other cargo likely to be damaged by taint.

Juniper oil.—An essential oil exported from Italy and central Europe. See Essential oils.

Jute.—See Jute, also Dangerous Goods, chapter IX.

Jute cuttings.—Stowage as for jute.

Kainite.—A potash fertilizer material shipped either in powder form in bags or in the rough in bulk. Exported chiefly from the Netherlands, France, and Germany, and used as a fertilizer. It must be kept perfectly dry, since if it becomes wet it forms a hard solid mass that has to be picked out of the vessel.

Kamala powder.—The powder from the capsules of the East Indian kamala tree, used for dyeing silk and wool and as a vermifuge. Usually shipped in bags, and should be given clean, dry stowage.

Kangaroo skins.—Shipped in bales from Australia. For stowage, see Leather.

Kaolin.—Another name for China clay, which see.

Kapok.—A fiber obtained from trees grown in the East Indies, particularly Java, also in Ecuador and some other regions. Used for stuffing lifebelts, upholstery, etc. It is usually packed in bales and should be given ordinary dry stowage. Kapok is classed as hazardous cargo. See Dangerous Goods.

Karakul skins.—The furred skins of a broadtail sheep, shipped in bales from U. S. S. R. See Furs.

Karaya gum.—See Gums.

Kardi.—See Safflower.

Kauri gum—See Gums.

Kayu putch or cajeput.—See Essential oils.

Kerosene.—A combustible liquid. See Dangerous Goods, also Petroleum Products, in chapter IX.

Kettle dross.—Shipped in bags principally from Peru and Chile, and has a high value. Stowage in dry place in hold.

Kittul fiber.—A coarse fiber obtained from the jaggery palm. See Fibers.

Kola nuts (cola nuts).—Another name for goora nuts. The seed of a tropical West Indian and African tree which possesses tonic and antiseptic properties. The nuts are about the size of walnuts and are shipped in bags, which should be given dry, cool stowage in a well-ventilated place, as the nuts are likely to heat on long voyages. They have no objectionable qualities that might taint other cargo.

Kolinsky skins.—A furred skin shipped in bales chiefly from U. S. S. R. See Furs.

Lac (stick lac, raw shellac).—A resinous substance obtained from the banyan tree. Shipped principally from India, Singapore, and Bangkok, and in its natural state called "stick lac." After being boiled in water it is called "seed lac." Shipped in cases and bags. Lac dye is the matter precipitated during the boiling treatment which, when dry, is pressed into cakes. Lac yields a scarlet coloring matter and is used in the manufacture of sealing wax and varnishes. It is commonly shipped in boxes lined with mats; sometimes in bags. All forms of lac should be given dry, cool stowage. When stowing cases, place them on edge, as this will prevent the sheets of lac adhering to one another and forming a solid block, if heated. Lac is classified as a hazardous article as it is readily combustible.

Lacquer, liquid.—Usually an inflammable liquid. See Dangerous Goods.

Lambskins, pickled.—Shipped in tierces and casks, chiefly from Argentina and Uruguay. Treat as wet, odorous cargo, and stow away from dry or delicate goods subject to damage from moisture and tainting.

Lampblack.—A sooty material used in the manufacture of ink, etc., and shipped in bags, kegs, paper-lined cases, etc. Should be stowed so as to protect other cargo from possible shifting. Susceptible to damage from moisture, and should be given good, dry stowage. Lampblack, if newly made, is said to be subject to spontaneous combustion, and in some ports is classed as hazardous cargo. Should be stowed near a hatchway so as to be readily accessible in case of fire.

Lard.—Frequently shipped in refrigerated space. If stowed in a hold or 'tween-deck, a cool place should be selected, one recommendation being that it should be stowed below the water line. In warm weather, lard should not be stowed directly under an exposed steel deck, as the heat from the deck will melt and damage the upper tiers. Stow lard apart from odorous goods, such as turpentine, which might taint it. Also, away from delicate foodstuffs, since lard is likely to taint such cargo.

Latex.—See Rubber latex.

Laurel leaves.—Shipped in bags chiefly from Portugal, Spain, and Italy. See Leaves.

Lavender flowers.—An aromatic shrub cultivated for its perfume and oil. Shipped principally from France and Spain. Dry stowage, away from moist, oily, or odorous goods.

Lavender oil.—An essential oil shipped from Morocco, France, United Kingdom, and elsewhere. See Essential oils.

Lead.—Lead is shipped in a number of forms, such as pigs, sheets, bars, and piping. Large quantities are exported chiefly from Peru, Chile, Newfoundland, Canada, and Australia.

Pigs and bars of lead should be stowed right across the vessel on the tank top or ceiling, if possible. They should not be tiered in a high block. Sheets in cases should be stowed on the flat. When in rolls, care must be taken to prevent damage from heavy cargo stowed above it or from uneven dunnage. Rolls are frequently further protected by burlap. Lead piping also must be protected against denting, bending, etc., by other cargo.

Lead arsenate.—A poisonous article. See Dangerous Goods.

Lead arsenite.—A poisonous article. See Dangerous Goods.

Lead azide.—A dangerous explosive. See Dangerous Goods.

Lead, black.—See Blacklead.

Lead dross.—Consists of the dross, scrap or waste from sulfuric acid. A semihazardous article. See Dangerous Goods.

Lead nitrate.—An oxidizing material. See Dangerous Goods.

Lead ore.—See Galena, also Ores, chapter IX.

Lead scrap.—Hazardous. See Dangerous Goods.

Lead styphnate.—A dangerous explosive. See Dangerous Goods.

Leopard skins.—Shipped in cases chiefly from Colombia and Brazil. For stowage, see Furs.

Leather.—Shipped in bales, rolls, bundles, and wooden boxes. Leather should be given dry stowage, away from oily or greasy goods and from acids, tar, etc. Bundles and bales should be well protected against contact with iron and against chafing.

Leather bleach.—May be an inflammable liquid. See Dangerous Goods.

Leaves.—Leaves, such as boldo leaves from Chile, areca leaves from Brazil, buchu, senna, sumac, etc., are shipped in bags and in bales, and should be given dry stowage, in a ventilated place, away from greasy, moist, and odorous goods. Leaves that have a strong scent should be kept away from goods which they might taint.

Lemons.—See Fresh Fruit, also Refrigerated Cargoes, chapter IX.

Lemon-grass oil.—An essential oil shipped chiefly from India, Madagascar, and Guatemala. See Essential oils.

Lentils.—Shipped largely from the Mediterranean, Chile, and Ecuador, usually in bags. No odor. Require stowage in a dry, ventilated place, away from heat.

Lewisite.—Poisonous. See Dangerous Goods.

Licorice root.—A dried root shipped chiefly from Spain, Turkey, Syria, Italy, Greece, Iraq, and U. S. S. R., usually packed in bales or cases, which should be given ordinary dry stowage. It is used in confectionery and medicines, and for fire extinguishers to produce a froth to smother a fire. The liquid extract, packed in barrels,

should be treated as wet cargo, as should the paste extract, which is usually shipped in cases and may drain on other cargo.

Lignaloe.—See Rosewood oil.

Lignason (insecticide).—The Board of Underwriters of New York states that: "Our attention has been called to the fact that the above captioned commodity is liable to give off fumes and gases, thereby damaging and discoloring other commodities. * * * It should be stowed in an oil hatch only with plenty of ventilation and with no other general cargo in that hatch; otherwise must be shipped on deck."

Lignite.—Brown coal mined in Germany, Nova Scotia, and New Zealand. See Coal, in chapter IX.

Lignum vitae.—A hard, close-grained wood grown in Jamaica, and South and Central America. It is the heaviest known wood and is usually shipped in short lengths.

Lime (calcium oxide or quicklime).—A hazardous article. See Dangerous Goods. This is also identified as unslaked lime or unhydrated lime. It is in the form of white, hard lumps and is obtained by burning limestone. It combines with water, giving off great heat sufficient to cause ignition in contact with combustible substances. Absorbs moisture from the air. Stow away from foodstuffs, organic materials, acids, and explosives, and keep dry. It is usually shipped in drums and is frequently stowed on deck.

Slaked lime, or lime combined with water, is usually shipped in barrels or bags, and should be stowed in a dry place away from wet or moist cargo.

Lime, acetate of.—Dry stowage.

Lime, borate of.—Shipped in bags. Should be given dry stowage.

Lime, chloride of.—See Bleaching powder.

Limes.—A citrus fruit shipped in the green condition chiefly from the West Indies, usually packed in barrels. Should be stowed in ventilated or refrigerated space (not below 40° F.).

Lime juice.—When shipped in bottles packed in cases, should be stowed in the ship's special cargo locker and guarded carefully against broaching.

Lime oil.—An essential oil, shipped in drums from Mexico, British Guiana, Trinidad, and other West Indian Islands. See Essential oils.

Linoleum.—A floor covering made of cork dust and linseed or similar oils. It is shipped crated and in rolls covered with stout paper or gunny. Crates should be stowed on end; if stowed on their sides, the linoleum is likely to crack. Rolls should be stowed flat with no other cargo except the lightest goods on top of them. Dunnage wood underneath should run in the same direction as the rolls to prevent denting of the linoleum.

Linseed.—The seed of the flax plant from which linseed oil is obtained. It is shipped in bags and bulk, usually the former, chiefly from Argentina, Uruguay, India, China, and U. S. S. R. When in bags, it must be well dunnaged and ventilated, as it is very liable to heat. When shipped in bulk, it must be stowed like grain, with close-fitting shifting boards, since linseed is exceptionally smooth and likely to shift.

Linseed cake.—A cattle feed made from the refuse of linseed after extraction of the oil. It is liable to heat and should consequently be stowed in a well-ventilated place and well away from cargo likely to be affected by the heat thrown off by the cake. It should also be stowed clear of odorous goods such as onions, fruit, and turpentine, which might taint it.

Linseed oil.—Shipped in barrels and drums, and occasionally in bulk. Regular barrel or drum stowage, when shipped in these containers. Sawdust should never be used where it may mix with linseed oil, as these substances in combination are liable to spontaneous combustion and a similar hazard is created if jute, cotton, gunnies and textiles become stained with linseed oil.

Liquefied petroleum gas.—An inflammable gas. See Dangerous Goods.

Liqueurs.—Should be stowed in special cargo locker or some other very safe place to avoid pilferage.

Livestock.—See Livestock, chapter IX.

Locust beans.—The pod of the Carob tree. See Carob beans.

Locust-bean gum.—See Tragasol; also gums.

Locust-bean flour.—A flour made from the locust bean and shipped in bags chiefly from Greece. Stowage as for flour.

Locust meal.—The flour or meal obtained from the locust bean. Should be given dry stowage, well away from moist or odorous goods.

Logwood.—A deep red wood used for making a dye. Shipped from Central America and the West Indies, usually in bundles. It requires no special stowage.

London purple, solid.—A purplish powder compound of calcium arsenite and calcium arsenate, and used as an insecticide. It is a poisonous article. See Dangerous Goods.

Lubricating oils.—Shipped in tins in cases, in barrels, and in various other containers. See Petroleum Products, in chapter on Stowage of Special Cargoes. In some countries lubricating oil is classed as a hazardous cargo.

Lucerne seeds (Alfalfa).—Stowage as for seeds.

Lumber.—See Lumber, in chapter IX.

Lupulin.—A yellow resinous powder obtained from the hop plant and used medicinally. It is usually shipped in cases, and should be given clean, dry stowage.

Lycopodium.—A powder obtained from an evergreen plant and used medicinally. Shipped chiefly from Central Europe and Japan, usually in kegs. Dry stowage, away from moist, oily, or odorous goods.

Lye.—See Caustic soda, solid.

Lynx skins.—Shipped chiefly from Canada, China, India, Brazil, and U. S. S. R. See Furs.

Macaroni.—Should be stowed as delicate cargo, well away from fresh fruit, onions, and other cargo likely to damage it by taint or by throwing off moisture.

Macassar oil.—Should be stowed in as cool a place as possible and away from any cargo likely to be damaged by leakage.

Mace.—A spice shipped from Singapore and other Eastern ports and from the West Indies. It should be stowed as dry, fine cargo, well away from moist, oily, or greasy goods.

Machinery.—Owing to the various kinds of packing, variation in dimensions and weights, etc., it is impossible to lay down any clear or definite rules for the stowage of machinery. If possible, stowage on the skin of the lower hold should be kept for the heavy cases, and these may be built around with other cargo. The lighter cases should be given upper stowage, but well secured. All cases of machinery should be handled carefully, as they often contain very light cast iron parts, which, even with the sharp turning over of a case, will sometimes be broken and the machinery seriously damaged.

Madder.—The root of the madder plant, which gives a bright-red coloring matter. Shipped chiefly from India, Greece, and Turkey, in bales, barrels, or cases. Should be given good, dry stowage, as it absorbs moisture readily and deteriorates as a consequence.

Mafueira.—See Sunflower seed.

Magnesia.—A light, white, earthy powder used medicinally. Should be stowed in a dry place, as salt water or damp air will injure it.

Magnesium arsenate, solid.—A poisonous article. See Dangerous Goods.

Magnesium, metallic.—An inflammable solid. See Dangerous Goods.

Magnesium nitrate.—An oxidizing material. See Dangerous Goods.

Magnesium perchlorate.—An oxidizing material. See Dangerous Goods.

Magnesium peroxide.—An oxidizing material. See Dangerous Goods.

Magnetite.—An important ore of iron, which is shipped in bulk chiefly from Scandinavia and U. S. S. R. See Ores.

Maguey, or cantala.—A fiber shipped from the Netherlands Indies. See fibers.

Mahogany (acajon).—Shipped chiefly from Honduras, Haiti, Cuba, Jamaica, and West Africa. Should be stowed away from oils or other substances that would stain the timber. When loading logs with chain slings, the slings should be well covered to prevent denting the logs.

Ma huang (ephedra).—A dried herb, used medicinally, and shipped from China, India, and Japan, and in lesser quantities from Spain. Dry stowage away from moist, oily, and odorous goods.

Maize.—See Corn.

Malangas.—The roots of a West Indian plant, used as a foodstuff. Similar to yams. Shipped in bags and in barrels chiefly from Dominican Republic. Stowage as for potatoes.

Mallet bark.—Shipped from south Australia and used for tanning purposes. See Barks.

Malt.—Grain, usually barley, steeped in water until it germinates and then dried in a kiln or oven. Usually shipped in bags, which require good bagged grain stowage. Malt must be protected against moisture, since it absorbs moisture readily, and if at all damp is not suitable for brewing.

Mandioca (manioc).—A meal or flour obtained from the roots of the mandioca or cassava plant and shipped chiefly from Brazil, Netherlands Indies, China, Dominican Republic, Jamaica, and Cuba, in

barrels and bags. Should be given dry stowage clear of damp and odorous goods. It is chiefly used for making tapioca, but also in plastics, and in making adhesives such as the gum on postage stamps.

Manganese dioxide.—An oxidizing agent classed as a hazardous article. See Dangerous Goods.

Manganese ore.—An important ore shipped chiefly from India, the Gold Coast, U. S. S. R., Black Sea ports, Brazil, and Peru. See Ores, chapter IX.

Mangle bark extract.—This is the same as mangrove extract.

Mangoes.—The edible fruit of a tropical tree, exported chiefly from Cuba. Stowage as for Fresh Fruits. See Refrigerated Cargoes.

Mangrove bark.—Used in tanning. Shipped in bags from Malaya, Netherlands Indies, British Borneo, East Africa, Madagascar, and elsewhere. See Barks.

Mangrove extract or cutch.—This is the extract obtained by steeping mangrove bark in water and then evaporating the water. It is used in tanning and is usually prepared in the form of cubes which are packed in bales and shipped from the same regions as mangrove bark. Should be given ordinary dry stowage. See also Cutch.

Manjeet (munjeet).—A portion of an East Indian plant which is used as a red dyestuff. Shipped in bales, barrels, and cases, and should be given good, dry stowage, as it absorbs moisture and will deteriorate if it becomes damp.

Manna.—A sweetish substance obtained from the stems of a species of ash of southern Europe. Used medicinally, and shipped principally from Italy. Ordinary dry stowage, away from moist, oily, or odorous goods.

Marble.—Shipped in large blocks, in slabs, and in slabs in crates, chiefly from Argentina and Italy. The blocks should be stowed on the tank tops or ceiling, should be well blocked off and if polished the polished side should be well protected against chafing. No heavy goods that would subject the marble to strains should be stowed on top of the blocks. Moderate-sized slabs should be stowed on edge like glass, also slabs in crates. Marble should be kept clear of all oily and greasy cargo, also acids, as it will absorb leakage from this type of goods and suffer severe damage.

Margarine.—Should be stowed in a cool place, away from any cargo likely to be damaged by possible leakage, and away from odorous goods.

Marjoram.—An aromatic plant used in cooking and as a stimulant. Shipped chiefly from Mexico, Chile, and Canada. It is usually packed in bags or in bales and should be given dry stowage away from heat and odorous goods.

Marmot skins.—The coarse-furred skin of the marmot, a rodent resembling the woodchuck. Shipped in bales chiefly from U. S. S. R. See Furs.

Marten skins.—The valuable furred skin of the marten, a weasel-like animal. Shipped in bales. See Furs.

Mastic.—See Gums.

Matches.—These are classed as inflammable solids. See Dangerous Goods.

Regarding stowage, the Board of Underwriters of New York states that:

"Strike on box" which include the ordinary paper book matches and "Strike anywhere" matches made and packed in accordance with the I. C. C. regulations should be stowed in a vessel's upper decks, shelter deck or poop, away from heat and steam pipes. If an upper deck stowage is not possible, they can be stowed in a hold; but in all cases the class of cargo where matches are stowed should not be liable to spontaneous combustion or of an inflammable nature. No cargo hooks are to be used during loading. All packages must be intact with no broken or damaged containers, and they must be stowed in a solid block with no danger of chafing. The condition of the container and solidity in stowage are two vital factors in safe carrying.

Mathie (methey seed).—This is Fenugreek. Stowage as for seeds.

Matting.—Made of various materials, such as rush grass, coir, bamboo, and straw. The higher grade mattings are made up into rolls and covered. These should never be over-stowed with other cargo, as they have considerable value and must not be crushed. Coarser grades of matting are made up into bales or bundles, which should not be stowed under heavy cargo.

Mawah seeds and oil.—See Mowrah.

Meat, frozen.—See Refrigerated Cargoes.

Melons.—From Chile and elsewhere, in crates. Practically always stowed in regular cargo space, but require a well-ventilated place.

Menthol crystals.—Obtained from oil of peppermint and used medicinally. Shipped from Japan, also from European countries. usually in cases. Should be given dry stowage away from delicate goods and foodstuffs which might be tainted by their penetrating odor.

Mercury (quicksilver).—Shipped in metal flasks, usually holding 75 pounds, and exported chiefly from Mexico, Spain, and Italy. No special stowage required, but because of mercury's concentrated weight, it should not be stowed on top of fragile or easily crushed goods.

Mercury compounds.—There are a number of these compounds, such as mercuric acetate, mercuric oxide, and mercuric sulfate. Classed as poisonous articles. See Dangerous Goods.

Mercuricyanamid.—Poisonous. See Dangerous Goods.

Mercury fulminate. (Fulminate of mercury).—A dangerous explosive. See Dangerous Goods.

Mesityl oxide.—A combustible liquid. See Dangerous Goods.

Metal polishes.—Many of these are inflammable liquids. See Dangerous Goods.

Metal scrap.—When carried in bulk, may be stowed as convenient, but if rusty it must be well-dunnaged and matted before overstowing with other cargo.

Methane.—An inflammable gas. See Dangerous Goods.

Methie seed.—See Fenugreek.

Methyl acetate.—An inflammable liquid. See Dangerous Goods.

Methyl acetone.—An inflammable liquid. See Dangerous Goods.

Methyl alcohol.—An inflammable liquid. See Dangerous Goods.

Methyl amyl acetate.—A combustible liquid. See Dangerous Goods.

Methyl amyl petone.—A combustible liquid. See Dangerous Goods.

Methyl bromide, liquid.—Poisonous. See Dangerous Goods.

Methyl chloride.—An inflammable gas. See Dangerous Goods.

Methyl dichlorarsine.—Poisonous. See Dangerous Goods.

Methyl formate.—An inflammable liquid. See Dangerous Goods.

Mica.—A silicate that cleaves in thin, tough scales or sheets. Shipped in splits, blocks, film, etc., chiefly from India, Brazil, Mexico, Peru, and North China, in paper-lined cases in sheet form, and the waste in bags. Should be given 'tween-deck stowage, and must be protected from salt water. Mica is widely used as an insulating material, as it is virtually impervious to heat. It is employed in the manufacture of radio tubes and many other electrical appliances, and in airplane spark plugs, and the lower grades are used in making roofing, paints, wallpaper, and certain types of decorative glass.

Middlings.—A coarse part of ground wheat, intermediate between flour and bran, and used as a food for animals. It is shipped in bags and requires ordinary dry-bag stowage.

Milk, condensed and evaporated.—See Canned goods.

Millet.—A name for several kinds of seed grown and used for food chiefly in India and China, such as kaoliang, bajra, jowar, kurbi, cholam, and talla. It is shipped in bags and requires stowage as for seeds.

Mineral oils.—See Petroleum Products, in chapter on Stowage of Special Cargoes.

Mineral waters.—Usually shipped in bottles in cases, with straw or other protective packing. They should be handled carefully and stowed in a cool, dry place, as moisture will rot the packing and damage the labels. Heat may also cause the bottles to explode.

Mirabolans (myrabolans).—Small berries used in tanning and dyeing, and shipped in bags principally from India and Burma. They are not readily damaged, and are free from odor. Stow as ordinary bag cargo.

Mirbane, oil of.—See Nitrobenzene.

Mixed acid.—See Nitrating acid.

Mohair.—The hair of the Angora goat. It is packed in bags and bales. See Wool.

Molasses.—This product is being increasingly carried in bulk in tank vessels, but is also carried in casks and hogsheads, which should be given good barrel stowage. Considerable leakage may be expected, the loss in weight sometimes amounting to as much as 10 percent on a long voyage. It should be treated as wet cargo and kept away from dry or fine cargo. Molasses should never be stowed over sugar, even of the coarsest grade.

When carried in tank vessels, if loaded after oil has been carried, the greatest care must be taken to clean the tanks and pipe lines thoroughly to avoid taint. The cleaning is frequently done by means of steaming and washing with salt water. Caustic soda and fresh water have also been employed.

Molybdenum ore and concentrates.—Shipped chiefly from the United States, Turkey, and Mexico. See Ores, chapter IX.

Monazite sand.—This sand is shipped from Brazil and India and is usually packed in bags, sometimes in old petroleum tins. It contains thoria which yields thorium nitrate, used in the manufacture of incandescent gas mantles. Requires no special stowage.

Monkey nuts.—See Ground nuts.

Monochlorbenzene (*chlorbenzene*).—A combustible liquid. See Dangerous Goods.

Monochloroacetone.—Poisonous. See Dangerous Goods.

Monomethylamine.—An inflammable gas. See Dangerous Goods.

Montan wax.—A mineral wax produced in Saxony from lignite, which closely resembles ceresin. Stowage as for waxes.

Moong beans.—See Mung beans.

Moonstone (*selinite*).—A form of gypsum, which see.

Mordant.—A substance used in fixing dyes. It is usually carried in barrels and should be stowed away from foodstuffs or any article likely to be damaged by leakage.

Morocco leather.—A valuable commodity, and should be given special stowage in a dry place, away from oils, greases, and acids, and kept free of rats. When shipped in rolls or bales, the use of cargo hooks should be strictly forbidden.

Moss.—Various kinds of mosses are shipped, usually packed in bales, which should be given dry stowage. Peat moss is exported from Sweden, the Netherlands, and other European countries, and the other mosses also originate chiefly in Europe. Used for surgical dressings, litter, etc.

Mother-of-pearl.—A shell used for ornamental work, and shipped in cases chiefly from Australia and Arabia. It is clean cargo and of considerable value, so should be given special stowage to prevent theft or pilferage.

Motion picture film, nitrocellulose base.—Classed as inflammable solids. See Dangerous Goods.

Motor fuels.—These are inflammable liquids. See Dangerous Goods.

Motor fuel antiknock compounds.—This liquid is poisonous, owing to the presence of tetraethyl lead. See Dangerous Goods.

Mowrah (*mawa, mowa*).—The seeds of the mowrah plant of India, East Africa, and elsewhere. See Seeds. The oil is shipped in drums. See Vegetable oils.

Mules.—See Livestock, in chapter IX, Stowage of Special Cargoes.

Mung beans.—A species of kidney beans shipped chiefly from the East Indies, usually in cases or packages. Stowage as for Beans. Do not stow near tea.

Mungo.—A fine woolen fiber obtained from compacted rags and used in the manufacture of low-grade woolen goods. Stowage as for Rags.

Munjeet.—See Manjeet.

Muriatic acid (*hydrochloric acid*).—A corrosive liquid. See Dangerous Goods.

Muru muru kernels.—Yields an oil that is used in soap making, as a lard substitute, etc. Shipped in bags from Brazil. Stowage as for nuts.

Musk.—A scented substance obtained chiefly from the musk deer of Java, Ceylon, and Central Asia. It has a strong odor and must be stowed well away from foodstuffs and all other goods likely to be tainted. Treat as Essential oils.

Mustard seed.—The seed of the mustard plant, which is shipped in bags chiefly from India, China, Japan, Rumania, and the Netherlands, and should be stowed as ordinary bagged cargo. See Seeds.

Mustard gas.—A poisonous article. See Dangerous Goods.

Mutton.—See Refrigerated Cargoes, in chapter IX.

Myrabolans.—See Mirabolans.

Myrrh.—See Gums.

Nails.—Shipped in kegs and cases and sometimes in small heavy bags which may be stowed anywhere, but owing to the weight of the contents as compared to the containers, they must be carefully handled to prevent breakage. If in bags, nails should be stowed in block form; if stowed singly the bags will readily chafe.

Naphtha, coal tar.—An inflammable liquid. See Dangerous Goods.

Naphtha, petroleum.—An inflammable liquid. See Dangerous Goods also Petroleum Products, in chapter IX.

Naphtha solvent (coal-tar naphtha).—An inflammable liquid. See Dangerous Goods.

Naphthalene, crude and refined.—A hazardous article. See Dangerous Goods.

Naphthalin (coal-tar camphor, mothballs).—A hazardous article. See Dangerous Goods.

Nappee.—This is partly dried fish carried in the Far East. It should be stowed in a place by itself, well away from dry, perishable goods. The odor is very objectionable, and wet nappee should be given entirely separate stowage, as it is infested with maggots.

Neiloresin.—The Board of Underwriters of New York states:

> This commodity is a viscous liquid of clear amber color having a strong odor resembling resin with a flash point of 165° F. It should not be stowed in the same hold or the same deck with cotton, but cotton can be carried in the hold with "neiloresin" in the deck above, provided it is not over the hatches containing cotton below. If this commodity is carried in the shelter or bridge deck it must be separated from cotton in these decks by a few feet of general cargo, or by an open space. The containers of "neiloresin" must be in good condition to permit the above stowages.

Neon gas.—A compressed gas. See Dangerous Goods.

Neroli.—See Orange flower oil.

Newsprint.—See Paper.

New Zealand hemp (phormium fiber).—Stowage as for hemp.

Nickel carbonyl.—An inflammable liquid. See Dangerous Goods.

Nickel cyanide.—A poisonous article. See Dangerous Goods.

Nicotine salts (hydrochloride, salicylate, sulfate, tartrate.)—These are poisonous articles. See Dangerous Goods.

Niger seed (ramtil).—A black, oil-bearing seed shipped from India in bags. Stowage as for seeds.

Niger-seed cake.—An oil cake made from the residue of niger seed after the oil has been extracted. See Oil cake.

Niger-seed oil.—The oil obtained from niger seeds. It has very little smell. Regular barrel stowage for liquids; place so that leakage will not damage other cargo.

Nispero gum.—A form of chicle obtained from the sapodilla tree of the West Indies and Central America. It is shipped in bales or bags and is used in the manufacture of chewing gum. Should be stowed in a cool, dry place, away from moist or oily goods or cargo likely to damage it by taint; also away from bag cargo, which it will stain.

Niter.—A name sometimes applied to nitrate of soda.

Nitrate of soda (Chile saltpeter).—Shipped from Chile and Peru in bulk and in bags. It is soluble in water and, as it is likely to evap-

orate when stowed in a damp place, it must be given good, dry stowage. When stowed in any quantity, the objectionable odor may damage other goods. Stow away from fine and delicate cargo and from oils, greases, and goods subject to spontaneous combustion, as nitrate of soda will intensify a fire. It will damage guano if it contacts it.

In stowing full cargoes of nitrate of soda, it is recommended that it be stepped up in the holds half bag in from the wings, and also away from the bulkheads, owing to the excessive weight, in order to make the ship easy. It settles down to a solid mass and will not shift if stowed as described.

When loaded in bulk, it frequently forms pyramid-shaped piles in the holds. This sometimes tends to make the vessel roll excessively, and to counteract this tendency bagged nitrate of soda is stowed in the wings in order to increase the "moment of inertia" and thus give the vessel an easier motion in a seaway. See also Dangerous Goods.

Nitrating acid (mixed acid).—A corrosive liquid. See Dangerous Goods.

Nitric acid.—A corrosive liquid. See Dangerous Goods.

Nitrobenzene liquid (oil of mirbane, nitrobenzol).—A poisonous liquid. See Dangerous Goods.

Nitrocellulose.—See Dangerous Goods.

Nitrochlorobenzene.—Poisonous. See Dangerous Goods.

Nitrogen.—A compressed gas. See Dangerous Goods.

Nitrogen dioxide, liquid.—A poisonous article. See Dangerous Goods.

Nitroglycerin, liquid.—Explosive. See Dangerous Goods.

Nitroglycerin, spirits of.—An inflammable liquid. See Dangerous Goods.

Nitroguanidine, wet with water.—An inflammable solid. See Dangerous Goods.

Nitro mannite.—A dangerous explosive. See Dangerous Goods.

Nitrosoguanidine.—A dangerous explosive. See Dangerous Goods.

Nitrostarch.—Inflammable. See Dangerous Goods.

Nitrosyl chloride.—A compressed gas. See Dangerous Goods.

Nitrous oxide.—A compressed gas. See Dangerous Goods.

Numdahs.—These are goat's-hair rugs shipped from India, in bales. Ordinary dry stowage. Hooks should not be used in handling.

Nutmegs.—The dried kernels of the seeds of a tree found in the Malay Archipelago, the Banda Islands, Ceylon, Java, Sumatra, and the West Indies, particularly Jamaica and Grenada. Shipped in cases, barrels, and bags. Ordinary stowage according to the type of container.

Nutria skins.—Used for their fur. Shipped in bales and cases chiefly from Argentina, Chile, Peru, and Guatemala. See Furs, also Skins.

Nuts.—Many kinds of nuts are carried in international trade and are mentioned by name herein. Usually they are packed in bags, but sometimes in cases or barrels, and they are also frequently carried in bulk. Nuts are likely to heat and deteriorate. To minimize heating, they should be stowed in a cool, dry, and well-ventilated place, away from heated surfaces, well-dunnaged to permit air circulation, and not covered with other cargo. Nuts should be stowed clear of dry or delicate goods, as their heating may result in condensed

moisture. Edible nuts should not be stowed with guano or bone dust, or other commodities likely to damage them.

Much of the damage to nuts appears to be the result of shipping them in a new condition, before they have been adequately dried, or they are shipped in a wet condition, owing to exposure to tropical rains. Nuts which have been rained on should not be loaded until they have dried out.

Nut galls.—See Gallnuts.

Nux vomica.—The nutlike seeds of a tree which is native to the Coromandel Coast of India and Cochinchina and is also found in Ceylon and North Australia. The dry seeds have an intensely bitter taste, are very hard, and extremely poisonous, containing strychnine and brucine. Stowage and ventilation as for nuts.

Oakum.—This is tarred hemp generally made by unraveling and treating old rope. Usually shipped in bales. It should be treated and stowed as wet cargo, as the tar is likely to melt and run when subjected to heat. Do not use oakum bales for beam fillings and do not stow it over fine goods, on account of the odor and danger of possible leakage. Oakum is classed as a hazardous article. See Dangerous Goods.

Oats.—Oats are more likely than most other grains to heat and deteriorate, therefore good ventilation is essential. Should not be stowed over maize (corn), as heavy claims have frequently resulted on account of damage caused by heating and sweating. The courts have held that this is "improper stowage." See Grain, in chapter on Stowage of Special Cargoes, also Laws Relating to the Stowage and Carriage of Grain.

Ocelot skins.—Used for their fur, and shipped principally from Brazil, Peru, Uruguay, Colombia, Chile, Argentina, and Mexico. See Furs, also Skins.

Ochoco nuts.—These are shipped in bags chiefly from Guatemala. They yield ochoco butter, a fat used in soap making. Stowage as for nuts.

Ochre.—A colored clay, used as a pigment in color making. Usually shipped in drums and barrels and requires no special stowage.

Oils.—The principal oils are mentioned by name herein. They may be classified under the four following headings: Essential oils, fish oils, vegetable oils, and mineral oils. The stowage of each type is discussed under its proper heading, and mineral oils are discussed under Petroleum Products, in chapter IX.

Oil of vitriol.—See Sulfuric acid.

Oil cake.—The residue of various vegetable or fruit seeds and nuts from which the major portion of oil has been extracted. Made from cottonseed, linseed, ground nuts, Niger seed, rape seed, sesame seed, copra, mowra seed, poppy seed, castor seed, etc., and used as a cattle food. Usually packed in bags, but sometimes carried in bulk.

Oil cake is liable to spontaneous heating and possible ignition. It is subject to tainting by other odorous cargo, such as naphthaline, hides, turpentine, and creosote and, as it also gives off an objectionable odor itself, it should be stowed well clear of foodstuffs, living quarters, animal fats, or similar cargo subject to tainting. It should be kept dry and should be stowed away from sources of artificial heat, such

as the engine or boiler room bulkheads. Oil cake should also be kept away from moist goods, as moisture tends to soften it and make it moldy. It should be given good ventilation and it is recommended that hatches be removed whenever possible for this purpose.

Oilcloth.—Usually shipped in rolls. Stowage should be as for linoleum.

Oil of mirbane.—See Nitrobenzene, liquid.

Oiled textiles.—A number of oiled textiles are carried, including oiled clothing; painted cloth and canvas; waterproofed cloth and canvas; oiled, painted, or varnished paper; and oiled cloth. If not completely and properly dried, these are subject to spontaneous heating and ignition. They should be stowed in an accessible place so as to permit occasional checking in order to observe any spontaneous heating. Stow away from sources of artificial heat. Classed as hazardous articles. See Dangerous Goods.

Oiticica oil.—The oil obtained from the oiticica nut, and used in paint and varnish making. It is shipped from Brazil, usually in drums, many of which are second-hand. Should be treated as wet cargo and stowed so as to prevent possible leakage onto other cargo.

Okra.—See Refrigerated Cargoes, chapter IX.

Oleo oil.—The commercial name of an animal oil obtained from beef fat and used in the manufacture of margarine. It is shipped in tierces, barrels, and kegs, and requires no special stowage, but should be kept in as cool a place as possible and given ordinary barrel stowage.

Olibanum gum.—See Gums.

Olives.—Packed in casks and kegs and shipped in large quantities from Spain and other Mediterranean countries. Should be treated as wet cargo and stowed so as to prevent possible leakage onto other goods.

Olive oil.—Shipped in barrels, and should be given ordinary barrel stowage.

Onions.—Shipped in large quantities chiefly from Spain, Portugal, Italy, Egypt, and the United States, packed in open-mesh bags or crates. Should be well ventilated to prevent deterioration, and stowed loosely so that air may circulate between the containers. No goods subject to damage from tainting or from the large amount of moisture thrown off by onions should be stowed in the same compartment.

Bags of onions should not come into contact with iron, so that dunnaging of decks, stringers, etc., should be very carefully carried out for this reason, as well as to keep bags from contacting the water which collects on such parts as a result of the large amount of moisture thrown off by the onions. This also frequently makes it necessary for the scupper pipes to be overhauled and cleaned before commencing to load this cargo. The bags are often rotted by the moisture thrown off in the course of the voyage.

Onyx.—Shipped in blocks, etc., from Argentina. See Marble.

Oolakan oil.—See Eulachon oil.

Opium.—Usually packed in lined chests covered with hessian. Shipped chiefly from Turkey, Yugoslavia, and Bulgaria. This is a valuable cargo and should be stowed in the ship's special cargo locker or some other place which is absolutely safe against theft or pilferage.

Opossum skins.—Used for their fur, and shipped chiefly from Aus-

tralia, New Zealand, U. S. S. R., and Argentina. See Furs, also Skins.

Orange flower oil (*neroli*).—An essential oil shipped principally from France, the Netherlands, and United Kingdom. See Essential oils.

Orange oil.—Shipped in cases chiefly from Jamaica. See Essential oils.

Oranges.—Shipped in large quantities from the United States, Spain, Italy, Syria, Palestine, the Azores, West Indies, and elsewhere. See Fresh Fruits, also Refrigerated Cargoes, chapter IX.

Orchella (*archil*).—A lichen of the Cape Verde and Canary Islands, also found in Madagascar, South Africa, South America, and elsewhere. Yields the blue dyestuff orchil, and the litmus used by chemists for testing. It is packed in bales and should be stowed in a dry place, away from moist or wet goods.

Ore concentrates.—See Concentrates.

Ores.—See Ores, in chapter IX.

Origano bark.—Shipped chiefly from Chile. See Barks.

Origanum.—An aromatic plant of the marjoram family. Packed in bales and bags, and shipped from Syria, Greece, Turkey, and elsewhere. Stowage as for Leaves.

Origanum oil.—An essential oil shipped largely from Morocco and Syria, and used in medicine and perfumery. The commercial origanum oil is often thyme oil. See Essential oils.

Orris (*iris*) *root.*—A scented root obtained from several species of iris, and used in perfumery and medicine. Shipped chiefly from Italy and Morocco. It should be stowed away from foodstuffs or other cargo likely to be affected by the odor.

Orthotoluidine.—The Board of Underwriters of New York has issued an instruction to its surveyors covering orthotoluidine which reads as follows:

> Orthotoluidine (otherwise known as toluidine (ortho) and Toluidine Para)—Our attention has been called to the fact that the above commodity heretofore considered harmless can give off a vapor which may affect such commodities as linens, domestics, tobacco and other similar commodities. In view of the above please see that future shipments of the above captioned commodity be given special stowage, preferably oil hatch stowage and not in the same compartment with ordinary general cargo.

Otter skins.—Used for their fur, and exported from practically all the South American countries, Iran, Turkey, South and East Africa, and elsewhere. See Furs, also Skins.

Otto of roses.—See Attar of roses.

Oxygen.—A compressed gas. See Dangerous Goods.

Oyster shell.—See Shells.

Oysters.—These are shipped in barrels, in kegs, or tinned, and should be stowed in a cool place or on deck in a convenient place. They should not be stowed below among dry goods.

Ozokerite.—A waxy mixture of natural paraffins shipped from the principal European countries, and used for the preparation of candles, paraffin and ceresin. Some varieties have an unpleasant odor and should be stowed away from delicate goods. Stowage as for waxes.

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Paddy.—This is the name applied to rice before it is husked. See Rice, in chapter IX.

Paints.—Many ready-mixed paints are inflammable or combustible. See Dangerous Goods.

When carried in drums, the drums should be stowed on end on flat dunnage, and boards should be laid between each tier. The whole should be well blocked off to prevent shifting. Paint drums should never be stowed on their sides as pressure will cause the heads to slacken and give rise to leakage.

Paint-removing compounds.—Many of these are semi-inflammable liquids. See Dangerous Goods.

Palembang.—See Benzoin.

Palm kernels.—Obtained from the fruit of certain palm trees grown in Netherlands Indies, British Honduras, British Malaya, West Africa, and elsewhere. The kernels yield an oil which is extensively used in the manufacture of soaps, candles, margarine, etc. Palm kernels are likely to heat and sweat, and stowage should be same as for nuts.

Palm-kernel oil (*palm nut oil*).—Obtained from the kernels or nuts of the palm fruit. It smells like coconut oil, which it closely resembles, and is shipped in barrels and hogsheads. See Coconut oil.

Palm-leaf fiber.—Shipped chiefly from Brazil, India, Nigeria, Liberia, and Morocco. See Fibers.

Palm leaves.—The leaf of a palm used for making hats, fans, etc., shipped principally from Africa and the West Indies. Packed in bales, bundles, cases, seroons, etc. Should be kept dry, but otherwise require no special stowage.

Palm oil.—An oil obtained from the pulp of the palm fruit, whereas palm-kernel oil is obtained from the kernel of the fruit. Stowage as for coconut oil.

Palmarosa oil.—An essential oil shipped chiefly from India, the Netherlands Indies, and France. See Essential oils.

Papain.—See Pawpaw.

Paper.—Newsprint and some other papers are shipped in rolls. In some cases the ends of the rolls are protected by wooden disks; in other cases, the ends are protected only by extra layers of the paper in which the rolls are wrapped. (See fig. 71.)

Dunnaging should be thorough throughout, with paper in rolls, and all stanchions, ladders, etc., should be well covered with burlap to avoid chafing. Soft rope slings should be used for slinging paper rolls, and care must be exercised to prevent the rolls from striking against hatch coamings or the sides of ship when loading or discharging. Cargo hooks or pinch bars should never be used when handling paper in rolls.

It is essential that the ground tier be stowed on a firm, level floor, otherwise the bottom rolls may get badly distorted. In the end holds the greatest care should be exercised to ensure that the platform on which the lower tier of rolls is stowed is both level and firm. When a full cargo of paper is carried, a satisfactory way of doing this is by building a platform consisting of a series of steps, the width of which is to suit the diameter of the larger rolls, the platform to be resting on well-constructed bearers. When mixed cargoes are carried, the floor can be leveled off up to the turn of the bilge by other suitable cargo, such as clean, dry lumber, which is particularly useful for this purpose.

Small rolls about 21 inches in height, usually termed "cheese rolls" on the Pacific coast, are frequently carried and make very useful beam fillings.

Fine papers are usually packed in cases, and other types of paper are packed in bales and bundles, sometimes protected by means of wooden frames on top and bottom. In all cases, paper should be given careful stowage in a dry place to avoid damage from moisture.

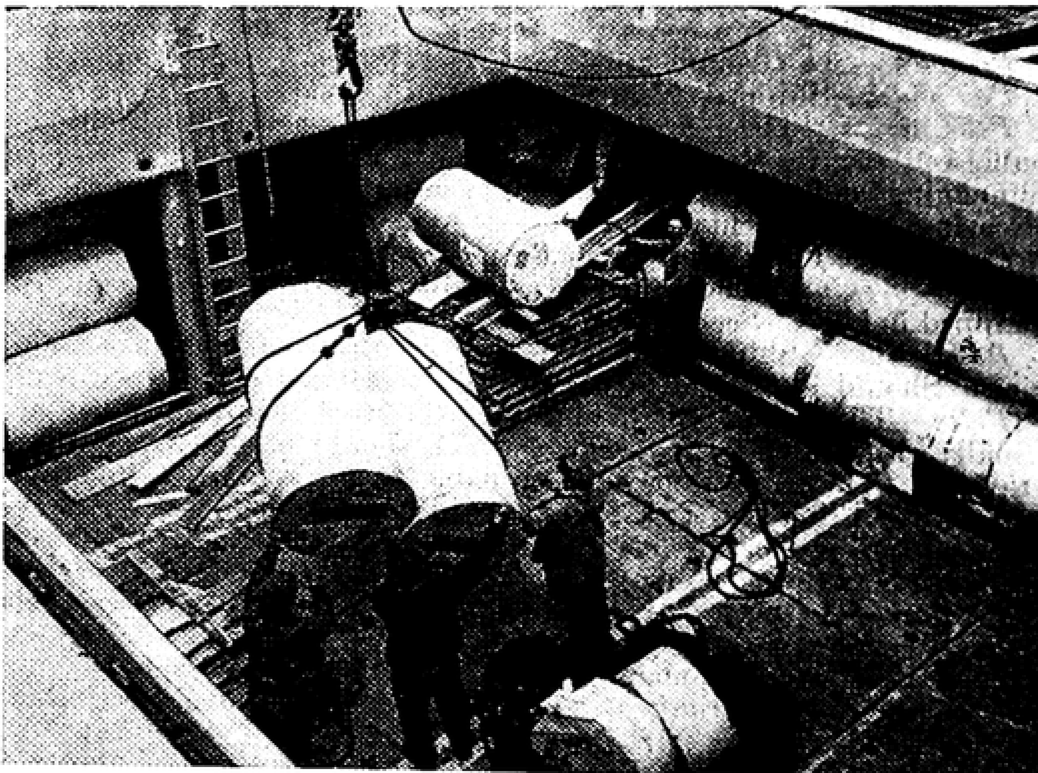

Figure 71.—Stowing newsprint in the 'tween decks.

Paper stock, wet.—Classed as an inflammable solid. See Dangerous Goods.

Paper waste, wet.—Classed as an inflammable solid. See Dangerous Goods.

Paprika.—A condiment made by grinding dried Spanish or Hungarian pimentos. It is shipped in bags and should be given clean, dry stowage as for foodstuffs.

Paraffin wax.—Should be given cool stowage to prevent melting, the melting point varying from 100° to 125° F. Should also be stowed clear of fine goods that might be damaged in case of melting and leakage.

Paraldehyde.—A combustible liquid. See Dangerous Goods.

Paranitraniline.—A poisonous article. See Dangerous Goods.

Paris green, solid.—A poisonous article. See Dangerous Goods.

Patchouli leaves.—An Eastern plant, shipped chiefly from British Malaya and Netherlands Indies, from the leaves of which a pungent oil is obtained. Because of its odor it should not be stowed near foodstuffs. The oil is an essential oil.

Patent fuel.—See Briquets.

Pawpaw (papain, papaw).—A small tree of the custard-apple family, bearing edible fruit. The fruit is shipped in macerated condition, in cases, as crude papain; and the juice, usually known as pawpaw juice, is also shipped. It is exported chiefly from Ceylon, Japan, Thailand, and New Zealand, and is usually given 'tween-deck storage. Do not stow near tea.

Pea cake.—An oil cake shipped from China. See Oil cake.

Peach kernels.—Shipped in bags and cases from China, Japan, and India. Dry stowage, away from moist, oily, or odorous goods.

Peanuts.—See Ground nuts.

Pea pulp.—Shipped from China. Moist goods.

Peas, dried.—These are packed in bags or sometimes shipped in bulk, and require stowage as for ordinary bagged goods, with good dunnaging and careful attention to ventilation to prevent heating, sweating, and fermentation.

Pears.—See Fresh Fruit, also Refrigerated Cargoes, chapter IX.

Peccary skins.—The skins of a hoglike South American animal. Shipped in bales. See Leather, also Skins.

Pecan nuts.—Shipped from Mexico, usually in the shelled condition. Should be stowed in a cool, well-ventilated place. See Nuts.

Pelts.—These are animal skins with the wool removed. They are usually shipped in casks or kegs which should be given good cask stowage. They are somewhat valuable cargo and care should be taken to see that the casks are in good condition, and if not, have them recoopered before loading. They should not be stowed near dry cargo, as the brine may leak from the casks during the voyage.

Pendare.—A species of chicle shipped in bales from Venezuela and Colombia. Stowage as for Gums.

Pentane.—An inflammable liquid. See Dangerous Goods.

Pentaerythrite tetranitrate.—A dangerous explosive. See Dangerous Goods.

Pepper.—Both black and white pepper are shipped in important volume from a number of Far Eastern ports, notably Singapore and Penang. Black pepper is the dried fruit of the pepper tree, and white pepper is the same fruit with the outer covering removed. It is best to keep the two kinds apart. Pepper is usually shipped in double bags, but also in barrels and boxes. It is likely to heat and sweat and should, therefore, be stowed away from fine and delicate goods, such as tea, also away from goods that are likely to heat, such as jelatong, gambier, areca nuts, and sage. Every effort should be made to give pepper good ventilation throughout the voyage.

Peppermint.—An herb widely used as a flavoring and in medicine. It is usually packed in cases which should be stowed well away from foodstuffs. The oil, shipped from U. S. S. R., United Kingdom, Japan, and elsewhere is used as an essential oil, which see.

Perchlorates.—Ammonium, barium, magnesium, and potassium perchlorate are strong oxidizing agents. See Dangerous Goods.

Perchloric acid.—A corrosive liquid. See Dangerous Goods.

Percussion caps and fuzes.—Classed as explosives. See Dangerous Goods.

Perfumery.—Essential oils are the raw materials from which perfumery is prepared. See Essential oils for stowage. The manufactured article is usually shipped in bottles packed in cases and should

be given careful stowage because of its relatively high value. The more expensive perfumes are frequently carried in the ship's special cargo locker or strong room.

Perilla oil (yegoma oil).—Extracted from the seeds of a plant cultivated chiefly in Manchuria. It resembles linseed oil, and is used as a substitute for linseed oil in varnishes. Should be stowed in the poop or a separate compartment away from foodstuffs, because of its odor and the possibility of leakage.

Perilla seeds.—The seeds from which perilla oil is obtained. Do not stow near tea. See Seeds.

Perillo gum.—A species of belata shipped in bags from Colombia and Panama. Not odorous, but should be given careful stowage as it will stain bag cargo.

Permanganates.—Ammonium, barium, potassium, sodium, and zinc permanganates are strong oxidizing agents. See Dangerous Goods.

Peru, balsam of.—Shipped largely from Nicaragua and El Salvador. See Balsams.

Peruvian bark.—See Cinchona.

Petitgrain oil.—An essential oil exported chiefly from Paraguay and Argentina, usually packed in cases. See Essential oils.

Petroleum ether.—An inflammable liquid. See Dangerous Goods.

Petroleum products.—See Petroleum Products, also Dangerous Goods, in chapter IX.

Phormium fiber.—Also known as New Zealand hemp; a leaf fiber. Stowage as for hemp.

Phosgene.—A poisonous article. See Dangerous Goods.

Phosphate rock.—Shipped in bulk chiefly from Tampa. Stowage as for ores.

Phosphoric anhydride.—An inflammable solid. See Dangerous Goods.

Phosphorus, amorphous, red.—An inflammable solid. See Dangerous Goods.

Phosphorus, white or yellow, in water.—An inflammable solid See Dangerous Goods.

Phosphorus oxychloride.—A corrosive liquid. See Dangerous Goods.

Phosphorus pentachloride.—An inflammable solid. See Dangerous Goods.

Phosphorus tribromide.—A corrosive liquid. See Dangerous Goods.

Photographic film.—Highly inflammable if made with a nitrocellulose base. See Dangerous Goods.

Photographic flash lamps.—Hazardous. See Dangerous Goods.

Piassava (piassaba).—A coarse fiber produced in Brazil and other tropical South American countries, also in Africa, and used in making brushes and brooms. Usually packed in bales or bundles, which should not be used as dunnage for dry goods, as piassava holds moisture. Stowage as for fibers.

Picric acid.—See Dangerous Goods.

Pig iron.—See Iron and steel.

Pignolias.—A nut shipped from Italy, Spain, and elsewhere, usually in cases. Stow in a cool, well-ventilated place. See Nuts.

Pimento.—See Allspice.

Pimento leaf oil.—Shipped in drums, chiefly from Jamaica. Odorous; should be stowed away from edibles and foodstuffs. See Essential oils.

Pimiento.—The fleshy fruit of the Spanish paprika, used as a vegetable, for stuffing olives, etc. The dried fruit is shipped in bags and should be given good, dry stowage. It is also shipped in tins packed in wooden cases, in which case it should be stowed as for canned goods.

Pineapples.—Shipped in fresh condition in crates; also in cans packed in cases. For fresh pineapples, see Fresh Fruit, also Refrigerated Cargoes, in chapter on Stowage of Special Cargoes. For canned pineapple, see Canned goods.

Pine oil.—A combustible liquid. See Dangerous Goods.

Pintsch gas.—See Dangerous Goods.

Pipe.—Because of the large number of different kinds of pipe, it is difficult to describe their stowage briefly. Cast-iron pipes are usually shipped singly and have to be carefully stowed, because they are subject to breakage, and also because they occupy a large amount of space in comparison with their weight. Cast-iron pipes of about 6 inches diameter and upward, with flanges, should be stowed fore and aft with wood laid underneath athwartship of sufficient height to keep the bell or flange clear on the lower tier. The tier above should be reversed, so that the bell is clear and stowed in the cantline of the tier below; reversing the bell or flange in the following tier, and so on. On no account should these pipes be stowed athwartship, since if one end should get hung up in any way, breakage would almost certainly occur. When a large quantity of cast-iron pipes of varying sizes is shipped it is often possible to nest them by putting the smaller ones inside the larger, and so save considerable space.

Wrought-iron pipes, such as gas pipes, are shipped singly and in bundles, and must be stowed according to their size, weight, and method of packing. In all cases they must be stowed carefully on an even bed, preferably fore and aft, and great care must be taken to avoid bending, a continual source of claims.

Extreme care in handling and stowage is necessary with oil-well casing, as the casing must be true to within a fraction of an inch. In loading and discharging, oil-well casing should be slung in drafts with the sling about 5 feet from the coupling end. This will prevent couplings from swinging and striking the coamings and will keep the draft from being landed on the couplings either on the dock or on the ship. In order properly to discharge this cargo in this manner the casing should be stowed in tiers, each tier having the collars toward the hatchway. In loading, the protector ends are landed first, and the collar ends allowed to remain under the hatch, so that when discharging it is not necessary to drag the collar end. The collars should all be one way, and wooden buffers should be used when dragging to protect pipe underneath.

Proper dunnaging is of great importance. For example, a carload of 3-inch casing was recently discharged with all pieces slightly sagged. Investigation showed that dunnage was used at both ends and none in the middle. The weight of the top cargo caused the sagging which resulted in large claims. Dunnage should be laid

freely and evenly. With small dimension casing, top stowage is essential. The ends of the pipe must not be allowed to project, for if they do and cargo rests on top, the pipe will be bent. Oil-pipe casing is very greasy and heat causes melting, so cargo subject to damage from this cause should not be stowed close alongside. Stevedores should not be permitted to use cargo hooks, as they may place a hook point in the threaded ends of the pipe and burr the edges. Paint marks should be used to separate car loads in the hold.

Pistachio nuts.—The fruit of a tree grown in Asia Minor and southern Europe and shipped chiefly from Syria, Egypt, Turkey, Iran, Italy, and India. Stowage as for nuts.

Pitch.—A substance obtained by boiling down tar and from the residue of distilled turpentine, etc. It is somewhat similar to asphalt, which see. Pitch melts when heated, and should be stowed well away from the engine and boiler rooms, and away from foodstuffs and fine cargo.

Pit props.—Short pieces of trunk of the fir and other trees, used in mining. Usually shipped in full cargoes principally from Scandinavia and Portugal, and requires no special stowage. The pit props should be less than 9 feet in length to get good stowage. Usually 10 percent of the cargo is shipped up to 13 feet in length. Their stowage varies in accordance with the time the pit props have been in the water prior to shipment. They are measured in fathoms, 1 fathom equaling 250 cu. ft., and weighing 2¾ to 3¼ tons.

Plantains.—A banana-like fruit. Shipped fresh, in bunches, chiefly from Cuba, Honduras, Panama, and Dominican Republic, usually under refrigeration. See Refrigerated Cargoes.

Plaster of Paris—Calcined gypsum; also any gypsum. Mixed with water, it sets rapidly into a hard concretion. See Gypsum.

Plumbago (graphite).—See Blacklead.

Plywood.—This commodity is shipped largely from the Baltic, packed into bundles and bales, with a rough piece of wood on each side held together with bands. Sometimes shipments are packed in wooden boxes. Plywood should be handled with meticulous care and when loading, defective pieces should not be accepted. The dunnage used should be covered with paper, and athwartship stowage is preferred. After stowage has been completed, the plywood should be covered with paper to prevent dust and debris from drifting onto the wood. Upper 'tween-deck stowage should be avoided. Do not overstow with any granular matter and keep clear of the wakes of ventilators.

Poisons.—See Dangerous Goods.

Police grenades.—See Dangerous Goods.

Polishes, liquid.—Many of these are inflammable or combustible. See Dangerous Goods.

Pollards.—Meal and bran mixed, and usually shipped in bags. Exported chiefly from Argentina. Stowage as for bagged grain. Pollards are likely to sweat, so should be well dunnaged, matted, and ventilated.

Pontianac.—A form of wet rubber. See Jelatong.

Pony skins.—Used for their fur and shipped from U.S.S.R., Argentina, China, and elsewhere. See Furs, also Skins.

Poonac.—Coconut cake. See Brunac, also Oil cake.

Poppy seeds.—The seed of the poppy plant, shipped chiefly from Turkey, Iran, and Poland. Seed is very small and light, therefore the bags used should be made of closely woven material, and care must be taken to prevent mixture with other seeds. See Seeds.

Poppy-seed oil.—The oil extracted from the poppy seed. Shipped chiefly from the Netherlands, United Kingdom, and France. See Vegetable oils.

Pork.—Fresh pork is usually carried in refrigerated space. See Refrigerated Cargoes. Pickled salt pork, packed in casks, tierces, etc., is wet cargo and should be stowed well away from dry or odorous goods. Precautions should be taken to protect other cargo against leakage.

Potash, caustic, liquid.—A corrosive liquid. See Dangerous Goods.

Potash, caustic, solid.—Hazardous. See Dangerous Goods.

Potassium arsenate, solid.—A poisonous article. See Dangerous Goods.

Potassium arsenite, solid.—A poisonous article. See Dangerous Goods.

Potassium bromate.—An oxidizing material. See Dangerous Goods.

Potassium chlorate.—A strong oxidizing agent. See Dangerous Goods.

Potassium hydroxide.—See Potash, caustic, solid.

Potassium metallic.—An inflammable solid. See Dangerous Goods.

Potassium nitrate.—An oxidizing material. See Dangerous Goods.

Potassium perchlorate.—An oxidizing material. See Dangerous Goods.

Potassium permanganate.—An oxidizing material. See Dangerous Goods.

Potassium sulfide.—An inflammable solid. See Dangerous Goods.

Potato spray (arsenical).—A poisonous article. See Dangerous Goods.

Potatoes.—Shipped in barrels, bags, and sometimes in crates, and should be stowed by themselves if possible. They require good ventilation. In cold weather there is considerable danger of frostbite, which can be avoided by covering with straw or mats and handling the ventilators so that no freezing air pours directly onto the cargo. Frozen potatoes should be rejected, as they will inevitably lead to claims. If in bags, frozen potatoes can be detected by the spots which will appear on the bags.

Preserved meats.—These are usually packed in tins, in cases, and should be given ordinary dry stowage, well away from moist cargo, to prevent rusting of the cans. Care should be exercised to prevent pilfering or broaching. See Canned goods.

Primers.—These are devices used to ignite the powder charges of ammunition or the black powder bursting charge of projectiles. They are classed as explosives. See Dangerous Goods.

Projectiles.—Explosive projectiles, bombs, grenades, mines, torpedoes. These are classed as explosives. See Dangerous Goods.

Propane.—An inflammable gas. See Dangerous Goods.

Propylene.—An inflammable gas. See Dangerous Goods.

Prunes.—The dried fruit of the plum. Usually packed in cases and should be given ordinary dry stowage away from cargo that might cause taint.

Psyllium seed (*plantago psyllium seed*, *fleawort*, *fleaseed*).—A small seed used medicinally and shipped chiefly from India, France, and Spain. See Seeds.

Pulp (*wood pulp*).—Chemical wood pulp has been treated with sulfite before shipment and is baled and shipped in a dry condition. It requires ordinary dry stowage. Mechanical wood pulp contains considerable quantities of moisture and is commonly called wet pulp. Wet pulp should not be stowed over any goods likely to be damaged from drainage, and should not be stowed in the same compartment with dry goods or foodstuffs subject to damage from moisture.

Pumice stone.—Shipped chiefly from Italy and Sicily, in bags. Requires no special stowage, but when shipped in the powdered form in bags, should be given extra careful handling, as the bags are likely to become torn, resulting in loss and mixture of the powder with other goods.

Putchok.—An Indian plant, the leaves and roots of which are used as incense, especially in China. Should be given dry stowage and because of its odor should be stowed apart from tea and other delicate cargo.

Pyrethrum or insect flowers.—Dried flowers used in the manufacture of insecticides exported chiefly from Japan, East Africa, Yugoslavia, Brazil, and Italy. Dry stowage, away from moist, oily, and odorous goods.

Pyridine.—An inflammable liquid. See Dangerous Goods.

Pyrites.—Metallic sulfides, such as sulfide of iron (iron pyrites), sulfide of copper (copper pyrites), etc. If struck with steel, they throw off sparks. Stowage as for ores.

Pyrosulphuryl chloride.—A corrosive liquid. See Dangerous Goods.

Pyroxylin solutions.—Inflammable liquids. See Dangerous Goods.

Pyroxylin plastics.—Sheets, rods, or tubes made of pyroxylin. Highly inflammable. See Dangerous Goods.

Pyroxylin plastic scrap.—Inflammable. See Dangerous Goods.

Pyroxylin solvents.—Liquids or mixtures of liquids that act as solvents of nitrocellulose. Inflammable. See Dangerous Goods.

Quassia (*quassia chips*).—The wood or bark of the bitter ash of the West Indies, particularly Jamaica, which is used as a tonic. Usually shipped in bags, and should be stowed in a cool place. No odor.

Quebracho.—A heavy wood shipped chiefly from Argentina, and extensively used for tanning purposes. The logs are very crooked and awkward to handle, but require no special stowage.

Quebracho extract (*powdered*).—Shipped in bags from Argentina, and must be carefully handled to prevent leakage. Ordinary dry stowage.

Queixada skins.—Shipped in bales from Brazil. See Skins, also Furs.

Quercitron.—The bark of the American black oak, from which a yellow dye is obtained. Shipped in bags and bales. Stowage as for barks.

Quicklime.—Unslaked lime. See Lime.

Quicksilver.—See Mercury.

Quillaya bark.—The bark of the quillaya tree, of which the inner layers are used in soap-making and for washing silk and printed goods. Shipped in bales from Chile. Odorless. Stowage as for barks.

Quina bark.—The bark of various South American trees, especially certain species of cinchona. Odorless. It is used medicinally and is shipped in bales, largely from Chile and Peru. Stowage as for barks, in a dry part of the ship, away from the machinery spaces.

Quinine.—The substance obtained from cinchona bark, produced in Peru and Java. It is usually put up in tins which are packed in wooden cases. Good, dry stowage is required, away from moist or oily cargo.

Quinine bark.—See Cinchona.

Quince seed.—The seeds of the quince tree, which are shipped largely from Iran, Palestine, and Syria. Stowage as for seeds.

Rabbits.—See Refrigerated Cargoes.

Rabbit skins.—Usually packed in bales, and are shipped chiefly from Australia and Argentina. They are valuable and should be given good, dry stowage and protection against chafing and contact with metal, dirt, etc. See Skins, also Furs.

Raffia grass.—A grass fiber shipped in bales chiefly from Madagascar and Belgian Congo. Dry stowage. See Fibers.

Rags.—Shipped in bales and bundles. Should not be stowed near oil or greasy articles, owing to the danger of spontaneous combustion. Stowage should be in the square of the hatch, readily accessible, and away from foodstuffs and delicate goods. Oily rags, containing more than 5 percent of animal or vegetable oil are classed as inflammable solids. See Dangerous Goods.

Care should be taken when accepting baled rags, if from a port where they may have been exposed to plague or cholera, since they many convey germs and vermin from port to port, and in some cases are landed only after much formality. Most countries insist upon the production of a sanitary certificate before unloading of rags is permitted. Therefore, if a certificate, properly endorsed, has not been obtained before shipment, the ship may be involved in much loss of time and money.

Railway fusees.—See Fusees, railroad.

Rails (railway iron).—Should be stowed fore and aft and well secured by means of chocks, toms, or wedges. When a full cargo of rails is carried, at least one-fourth of the weight should be placed in the 'tween-decks and should be well tommed down from the deck beams.

Pillars in the hold should have wooden battens placed between them and the rails. Good heavy pieces of timber should be placed vertically at the ship's sides, and the whole mass wedged tightly. The loading should be so arranged that when all is stowed, a level surface is presented right across the hold. Athwartship planks should be laid on top of the rails, and the hold filled up with other cargo solidly stowed. If the hold cannot be filled, the rails must be securely tommed down from the deck beams above.

Rails and other steel should be stowed as closely as possible. It should be chocked against shifting, and dunnaged between tiers for greater ease in passing chain slings when hoisting it out. The

stowage and securing of this cargo requires a considerable supply of timber.

Raisins.—Should be stowed away from wet or odorus goods, also from goods likely to heat and throw off moisture.

Ramie (*rhea*) *or China grass.*—A Chinese and East Indian plant of the nettle family, also grown in Haiti, and elsewhere. Yields a fine fiber, and is shipped in bales. See Fibers.

Ramtil.—See Niger seed.

Rape seed.—A small, dark oil seed shipped in bags chiefly from India, Japan, Black Sea ports, Argentina, and Rumania. The oil is known as rape-seed oil and colza oil. Rape seed is likely to heat, especially if it is new, therefore good ventilation is essential. It should be stowed clear of hemp, jute, and other similar cargo, since there is danger of heating and fire if the seeds are in contact with these fibers.

Rape-seed cake.—The residue of rape seed after the oil has been extracted, and is used as food for cattle. Is very odorous, and is likely to heat and become soft and moldy. See Oil cake.

Rape-seed oil.—See Colza oil.

Rattan.—The long stems of a palm which grows in East India, Africa, and Australia. Used for basket making, furniture, etc. Usually shipped in bundles of 100 pieces. There are two grades, coarse rattan and fine or white rattan. The coarser grade is frequently used as dunnage under fine cargo and, as rattan absorbs moisture, it is good material to use with bagged commodities likely to heat, such as sago, pepper, and tapioca. The coarser grade can be stowed with practically any cargo, even on top of jelatong, if good dunnaging is laid between. White rattan should not be used as dunnage except with cargo that will not heat and sweat, and then only if the bill of lading does not prohibit its use as dunnage.

If rattans are wet by rain, they should be rejected, for if stowed wet they will become badly marked and claims will result.

Refrigerated cargoes.—See chapter on Stowage of Special Cargo.

Refrigerating machines.—Assembled for shipment and containing not over 15 pounds of an inflammable liquid for their operation. Because of the inflammable liquid, such machines are considered as hazardous cargo. See Dangerous Goods. The use of cargo hooks should be forbidden when handling electric refrigerators in plywood boxes, as the hooks may splinter the plywood and seriously damage the enameled surfaces of the refrigerators, causing heavy claims.

Resins.—Exudations of various trees and plants, such as copal or gum resin, gum dammar, dragon's blood, and shellac. All are inflammable and will melt if heated. See Gums, also Dangerous Goods.

Rhea fiber.—See Ramie.

Rhubarb.—The root of an oriental plant, having cathartic and astringent properties, and used medicinally. Shipped from China. Dry stowage, away from moist, oily, or odorous goods.

Rice.—See Rice in chapter IX, Stowage of Special Cargoes.

Rice dust.—See Boussir.

Rice meal.—See Rice, chapter IX.

Road asphalt or tar.—This is classed as inflammable or combustible liquid, depending upon its flash point. See Dangerous Goods, also Asphalt.

Road oil.—Asphaltum or coal-tar liquids prepared for use as binders or dressings for road surfaces. See Dangerous Goods.

Rope.—Made of various materials, such as Manila hemp, coir, cotton, and wire. Should be stowed carefully and the coils chocked to prevent chafing. The smell of rope will often taint foodstuffs, such as tea, flour, and refined sugar, if stowed close by.

Rosemary leaves.—The pungent-smelling leaves of the rosemary shrub, from which rosemary oil is obtained. Usually shipped in bags, and exported from Spain, Portugal, and other Mediterranean countries. Should be given dry, clean stowage, away from foodstuffs or other goods that might be affected by their odor. See Leaves.

Rosemary oil.—An essential oil exported in drums chiefly from Tunisia, Morocco, Yugoslavia, France, and United Kingdom. See Essential oils.

Rosewood oil (lignaloe or bois de rose).—An essential oil shipped principally from Brazil, French Guiana, Curacao, Mexico, and France. See Essential oils.

Rosin (colophony).—The hard resin left after distilling off the volatile oil of turpentine. It is readily combustible and must be stowed away from all sources of artificial heat. For stowage with cotton, see section on cotton, in chapter on Stowage of Special Cargoes. See Dangerous Goods. The Board of Underwriters of New York states that rosin can be carried in the spare bunkers over the boiler room on motor vessels that have been converted from coal to fuel oil, as rosin melts at 212° F. and no bunker would reach such a temperature. The bunker, however, should have ventilation.

Rubber.—Crude rubber is usually packed in burlap bales or wooden cases, according to terms of contract between producer and customer. Ribbed smoke sheets in recent years have been packed in a bale covered on the outside with an equal quality rubber and no other material.

Rubber requires careful handling and cool, dry stowage. Heat causes deterioration; moisture causes mold and massing of contents. Care in separating lots is essential because of different value of grades. Guard against dust getting into the rubber, as this has been a prolific source of claims. As cases crush easily, light cargo should be stowed on top. While not very odorous, unless deteriorating, it is advisable to keep in separate compartment from goods affected by taint. It should also be kept away from wet or moist goods or those which are likely to heat and sweat, since heat from these goods might damage the rubber.

Rubber buffings.—May be inflammable. See Dangerous Goods.

Rubber latex.—Latex is shipped in drums or in bulk in the deep tank or peak tanks of the vessel. Great care should be exercised in loading drums to avoid splitting of seams which would permit leakage. Do not stack the drums too high, and do not stow them adjacent to scupper drains. If the latex reaches them in a liquid state, it coagulates quickly and will plug them up, possibly necessitating new piping owing to the difficulty of removing the mass. As the latex has an anticoagulant in it, such as ammonia, coagulation does not take place until the ammonia evaporates, but this happens fairly rapidly. Stow away from goods that may be damaged by ammonia odor, and destroy all dunnage affected by leaking drums.

Ship's tanks are prepared for carrying latex by application of a coat of paraffin or white Borneo wax, with melting point of 140° to 150° F. If the wax is applied at the boiling temperature, the coating is transparent; at lower temperature the coating is opaque. Some shippers require the transparent coating. It is desirable that the tank be filled as completely as possible to prevent splashing which causes frothing and loss of latex. Ships are sometimes listed to tank side to permit tanks being filled to within one-half inch of top opening, to eliminate air pockets at outer edge of tank. Before sealing the ship's tank, samples of a gallon each of latex are taken from near the bottom, about halfway down, and near the top of tank. These samples are thoroughly mixed and divided into three parts, each being placed in a 1-gallon bottle—one for the shipper, one for the ship, and one for the consignee.

Rubber scrap.—May be inflammable. , See Dangerous Goods.

Rum.—Shipped in hogsheads and casks chiefly from the West Indies. Rum is about the only spirit that is not harmed by heating. It is frequently shipped in the same vessel with sugar and, while both may be stowed in the same compartment, rum should on no account be stowed over sugar. Every precaution must be taken to guard against broaching of hogsheads, and rum in bottles packed in cases should be stowed in the ship's special cargo locker or other safe place. Denatured rum is classed as an inflammable liquid. See Dangerous Goods.

Rutile.—A mineral from which titanium, used in the manufacture of paints and for hardening steels, is derived. It is obtained from beach sand and is shipped chiefly from Brazil and Australia. Stowage as for ore.

Rye.—This grain does not run freely and consequently requires more trimming than other grains, and closer supervision at the time of loading, to make certain that it is properly trimmed. See Grain, in chapter on Stowage of Special Cargoes.

Sables.—A very valuable fur, usually shipped in strongly constructed, tin-lined boxes. Exported from U. S. S. R., China, and Canada. See Furs.

Safflower (kardi).—The dried flower of an Eastern plant which yields a red dye. Sometimes called carthamus seeds. Should be given ordinary dry stowage.

Safflower oil.—The oil obtained from the seed of the safflower plant. Usually shipped in barrels, which should be given ordinary barrel stowage. Precautions should be taken to protect other cargo against possible leakage.

Saffron.—The dried orange-colored stigmas of the saffron plant, used for coloring purposes. Shipped chiefly from Spain, Italy, and France. Is of considerable value and should be carefully stowed in a cool, dry place.

Sage leaves.—Shipped largely from Greece, Turkey, Yugoslavia, and Italy. Ordinary dry stowage away from moist or odorous goods. See Leaves.

Sage oil.—An essential oil shipped chiefly from U. S. S. R. See Essential oils.

Sago.—A variety of starch obtained from the sago palm which is found principally in the East Indies and China. Sago is likely

to heat, and is easily damaged by moisture or odors. Stow among dry goods only, such as tea, manioc, and tapioca.

Sago flour.—Stowage the same as for sago.

Sal-Ammoniac.—Ammonium chloride, which is used in the chemical industries, and is usually shipped in bags or barrels. It requires no special stowage, but must be kept perfectly dry as it absorbs moisture.

Salt.—Large quantities of salt are carried in bulk from such places as Turks Island, Bahamas; Torrevieja, Spain; Porbundar, Karachi, and Navalakhi, India; Massawah and Assab, Eritrea; Cagliari, Sardinia; and from Alexandria, Port Said, New Orleans, and San Francisco. Small quantities are carried in barrels and bags, and table salt is shipped in cartons and other retail containers packed in cartons and cases.

When salt is shipped in bulk, it is customary to clean the holds thoroughly before loading and to protect the salt from direct contact with metal by the use of mats or burlap, but dunnaging is not necessary. When carried in small quantities in bulk or in barrels or bags, salt should be stowed well away from dry goods that would be harmed by moisture. Salt should also be stowed away from moist or wet goods from which it might absorb moisture.

Saltpeter.—See Potassium nitrate.

Saltpeter, Chile.—See Nitrate of soda.

Salmon.—For canned salmon, see Canned goods. For frozen salmon, see Fish, frozen, in section on Refrigerated Cargoes.

Salvador balsam.—Shiped in drums chiefly from Salvador and Guatemala. See Balsams.

Samp.—Coarse hulled Indian corn, shipped in bags. Is likely to heat and sweat and should not be stowed near flour or other fine goods or with odorous goods, such as turpentine.

San hemp.—See Sunn fiber.

Sand.—Silversand, used in glassmaking, is sometimes carried in bulk when higher-paying freight is not available. If carried with other cargo that is likely to result in mixture, such as China clay, coal, coke, lime, and seeds, precautions must be taken to prevent mixture, which would result in claims. Other types of sand are frequently carried, usually packed in bags, and these do not ordinarily require any special stowage. Bilges and wells, however, should be carefully protected against sand.

Sandalwood.—A fragrant, valuable, and heavy wood obtained from a tree grown in India, China, and elsewhere. It is usually packed in bales, but is sometimes shipped loose. Since it is easily stained, it should be stowed well away from greasy or oily goods.

Sandalwood oil.—An essential oil shipped chiefly from India, Australia, and United Kingdom. See Essential oils.

Sandalwood powder.—This is shipped in cases from India and China, and should be protected against injury by leakage or drainage of wet cargoes.

Sandarac gum.—See Gums.

Saponin.—A white powder derived from various plants, chiefly soapwort and soapbark. It is used as a foam producer in beverages and fire extinguishers, in emulsifying oils, etc. Shipped in tins in cases, largely from Chile. Should be given good, dry stowage.

Sardines, canned.—See Canned goods.

Sarsaparilla root.—The root of a tree which grows chiefly in Brazil, Mexico, and Honduras. Should be given dry stowage away from greases and oily goods.

Sausage casings.—See Casings.

Sawdust.—Classed as a hazardous article, because of the susceptibility to fire from open flame or sparks. See Dangerous Goods.

Scheelite.—An ore from which tungsten is obtained. Shipped in drums and bags from Argentina, Australia, and elsewhere. Requires no special stowage.

Scheele's green, solid.—A poisonous article. See Dangerous Goods.

Scrap metal.—See Metal scrap.

Sea coal.—This is a term of Scottish origin, originally applied to coal mined at seaboard or from under the sea. Ground bituminous coal and foundry facings are sometimes called sea coal. It is classed as an inflammable solid. See Dangerous Goods.

Seal oil.—See Fish oils.

Seal skins, raw (not fur).—These are shipped in considerable quantities from Argentina, Newfoundland, Canada, Chile, and South Africa. Stowage as for skins. Seal skins with the fur on are valuable cargo and should be stowed in the ship's special cargo locker or other safe place. See Furs.

Seed lac.—See Lac.

Seeds.—Many different kinds of seeds are shipped in oversea commerce, including aniseed, canary, caraway, carthamus, castor, clover, coriander, cummin, fennel, gingelly, grass, hemp, jowari, linseed, millet, mowra, mustard, Niger, poppy, rape, sesame, sunflower, etc. All seeds require good, dry stowage, and must be kept well away from wet or moist cargo, as they may become heated. Particular care must be exercised in stowing the more valuable types of seeds. Such seeds are usually packed in bags of very close-textured material which are further enclosed in a second bag or wrapper. When stowing small quantities of these seeds with general merchandise the packages should be well protected against damage from chafing or through other goods contacting them. Single bags of seed have frequently been stowed between light case goods and during the voyage have been chafed and the contents almost wholly lost as a result.

Small seeds stowed together, such as poppy and rape seed, require great care to avoid mixture. If at all possible, it is advisable to stow such small seeds below and not on top of large seeds.

Selenite.—A pearly, usually transparent variety of gypsum, which see.

Semetin.—A class of fine quality middlings shipped in bags chiefly from Argentina. Like middlings, it requires ordinary dry bag stowage.

Semolina.—A wheat byproduct, somewhat similar to flour, and used in the manufacture of macaroni. Stowage as for flour.

Senega root (snake root).—A dried root of a North American plant, used medicinally. Shipped in bags and should be kept dry.

Senna leaves.—The dried leaves of a tree found chiefly in Arabia, Egypt, and India and used medicinally. Shipped in bales and bags, and should be given dry stowage away from greasy, moist, and odorous goods.

Sesame (sesamum) seeds.—Also called gingelly, benne, til, or teel seeds. Shipped in large quantities chiefly from Egypt, China, India,

Japan, Mexico, Venezuela, Salvador, and Guatemala. Should be given dry stowage, as for seeds, away from greasy, moist, and odorous goods.

Shark fins and hides.—Shipped largely from Australia, Cuba, Jamaica, Mexico, Venezuela, and various Pacific Islands. Usually in bags, bales, or barrels. They have a disagreeable odor and consequently should not be stowed with any cargo likely to be damaged by taint.

Shea butter.—Obtained from the nuts of a West African tree. Somewhat similar to palm oil, which see.

Shea nuts.—The nuts of the West African shea tree. Stowage as for nuts.

Sheep.—See Livestock, chapter IX.

Sheepdip or sheepwash.—A poisonous liquid, usually carried in metal drums. Should be stowed away from foodstuffs and other delicate cargo and, if possible, in a place entirely by itself.

Sheepskins.—Shipped in bales chiefly from Argentina, Uruguay, and Australia. See Skins.

Shellac, liquid.—An inflammable liquid. See Dangerous Goods. Shellac is also used as a term to describe lac, which see.

Shells.—Shells of different kinds, such as mother-of-pearl, tortoise, and oyster, require different stowage, according to the nature of the shell and the shipping container.

Mother-of-pearl shells of the higher grades are packed in cases and should be given careful stowage in a safe place to prevent theft. See Mother-of-pearl.

Tortoise shell is usually packed in cases or chests, sometimes in bundles, and is shipped chiefly from Singapore, Mauritius, Cape Verde Islands, Colombia, and Cuba. It should be stowed with dry cargo as choice or valuable freight.

The rougher type of shells are usually shipped in bags and require no special stowage, but should not be used for broken stowage or have heavy weights stowed above them.

Oyster shell, usually shipped crushed for poultry feed, is carried in bags. It should be carefully handled when discharging, as it will frequently be found that the bags have been cut by the contents and considerable loss may result. Oyster shells must also be protected against contamination by other cargo, such as the brine from salt hides, as many claims have arisen from such spoilage.

Shoyu (soyur, soy).—A sauce widely used in Japan and China and shipped to Europe and the United States. It is made from soybeans and coarse wheat, and is packed in casks and tubs, which should be stowed as wet goods, likely to leak.

Shumac.—See Sumac.

Siak.—See Gutta-siak.

Silicon chloride.—A corrosive liquid. See Dangerous Goods.

Silk.—This is usually packed in bales or cases, and as it is valuable cargo, it must be stowed in a safe place and carefully handled so as to prevent damage. It should not be stowed near wet or moist goods or near oil, tar, grease, and similar commodities. Silk waste is carried in bales and requires the same precautions.

Silk cocoons.—See Cocoons.

Silver sand.—See Sand.

Sisal (henequen).—Stowage as for hemp. Shipped chiefly from Mexico, East Africa, South Africa, Netherlands Indies, Salvador, Haiti, and Cuba. Sisal and other fibers that have been involved in a fire, or exposed to rain or other moisture are classified as inflammable solids. See Dangerous Goods.

Skins.—A large number of animal skins are carried in oversea commerce in different forms. The skins of fur-bearing animals are the most valuable and are dealt with under the heading, "Furs." Skins shipped in the wet or pickled condition are dealt with under "Hides," as are also dry hides; and tanned skins under "Leather." Cattle, sheep, horse, and goat skins constitute the bulk of the skin or hide shipments, but there are considerable quantities of other skins such as deer, cat, dog, rabbit, karakul, kangaroo, marten, and squirrel.

Dried skins are usually shipped in bales, although some of the smaller skins, such as rabbit, are sometimes packed in cases. All skins should be stowed well away from wet goods, as they readily absorb moisture and will soften as a result. Usually they are odorous and should not be stowed with fine goods or foodstuffs, such as flour, coffee, tea, and fruit. Bales should be stowed on the flat, particularly the ground tier, but wing tier above the ground tier on edge so as to confine any damage to the smallest possible number of skins. Good dunnaging should be laid beneath skins stowed in the ground tier, and bales should be protected against contact with metal parts on which moisture might condense by means of dunnage and matting. Rust stains on skins have given rise to numerous claims, and every care must be taken to prevent them.

Slates.—Slates are usually loose and should be stowed on their edges with plenty of straw or other cushioning material; preferably with battens between each tier. Slabs of slate require great care in stowing, as they are easily broken and should always be stowed on edge and well blocked off.

Sleepers.—See Ties, railroad.

Sludge acid.—This is waste or spent sulfuric acid, and is a corrosive liquid. See Dangerous Goods.

Sludge ore.—Shipped in large quantities in bulk from Spanish ore ports. When loaded in a wet condition, it is very likely to shift, and a number of vessels have been lost from this cause. Recommended practice is to load the ore only when it is in a perfectly dry condition, and to erect longitudinal bulkheads to prevent shifting.

Soap.—Manufactured soaps are usually packed in cases and may usually be stowed anywhere among general cargo, although it is recommended that, owing to the odor of many soaps, care be taken to stow such soaps away from fine and delicate goods, particularly if the voyage is to be through the Tropics.

Soft soap is generally packed in kegs or firkins, and should be treated as wet cargo and stowed away from cargo that might be damaged by leakage.

Soap bark.—See Quillaya bark.

Soapstone.—See Talc.

Soda.—This is the usual name for sodium carbonate, also soda ash, which is used in the manufacture of glass and soap, and for bleaching, washing, etc. It should not be stowed near dry goods, as it ab-

sorbs moisture and frequently melts; nor should it be stowed near galvanized or other iron goods.

Soda, Bicarbonate of.—A white powder which is largely used in the manufacture of baking powder. Usually packed in bags or kegs, it should be given careful stowage in a dry place, with no weight on top. Being a foodstuff, it must be kept well clear of any cargo that would contaminate it.

Sodium arsenate, solid.—A poisonous article. See Dangerous Goods.

Sodium arsenite (solution), liquid.—A poisonous article. See Dangerous Goods.

Sodium cacodylate, solid.—A poisonous article. See Dangerous Goods.

Sodium chlorate.—An oxidizing material. See Dangerous Goods.

Sodium chlorite.—An oxidizing material. See Dangerous Goods.

Sodium dimethylarsenate.—A poisonous article. See Dangerous Goods.

Sodium hydrosulfite.—An inflammable solid. See Dangerous Goods.

Sodium hydroxide (caustic soda, solid).—A hazardous article. See Dangerous Goods.

Sodium hydroxide solution (caustic soda, liquid).—A corrosive liquid. See Dangerous Goods.

Sodium metallic.—An inflammable solid. See Dangerous Goods.

Sodium nitrate.—An oxidizing material. See Dangerous Goods.

Sodium nitrite.—An oxidizing material. See Dangerous Goods.

Sodium perchlorate.—An oxidizing material. See Dangerous Goods.

Sodium permanganate.—An oxidizing material. See Dangerous Goods.

Sodium peroxide.—An oxidizing material. See Dangerous Goods.

Sodium picramate, wet with 20 percent water.—An inflammable solid. See Dangerous Goods.

Sodium sulfide.—An inflammable solid. See Dangerous Goods.

Solvent naphtha.—See Coal-tar naphtha.

Solvents.—These may be combustible or inflammable liquids. See Dangerous Goods.

Sorghum.—See Millet.

Soy.—See Shoyu.

Soybeans.—An oil-bearing bean shipped chiefly from Manchuria and North China, in bags and in bulk. The beans are likely to heat, sweat, and ferment, particularly if shipped in a damp condition. Recommendations regarding stowage, prepared by an experienced shipping firm at Dairen, Manchuria, state: "All iron work protected by hard mats. Should not be stowed against green or damp wood or in the same hold with any moist cargo. Wooden ventilators laid horizontally usually two, three, and afterwards every fourth tier from bottom. Laterally about every fourth or fifth row. Hatches must be opened as frequently as possible in the Tropics. Deck ventilators always to be turned away from the wind. Average number of wooden ventilators used per 1,000 tons—140 small (12 feet by 5 inches) for horizontal use; 10 large (12 feet by 8 inches) for vertical use."

Soybean cakes.—These are shipped in round and square (English

style) shapes. The round cakes are shipped without packing and the square cakes are packed in bags. See Oil cake.

Soybean oil.—This is shipped in drums and sometimes in second-hand kerosene cans, packed two to a case, or in second-hand barrels. In the latter containers there is considerable danger of heavy leakage, which must be guarded against in selecting the place of stowage.

Soybean oil is also carried in bulk, in which case the vessel's tanks must be thoroughly cleaned before loading. Tanks which have previously carried fish oil or fuel oil must be steamed out before carrying bean oil. Difficulty is sometimes experienced in pumping out this oil, as its viscosity is easily affected by changes in temperature, and detention and claims for short delivery sometimes arise as a consequence.

Spelter.—The commercial name given to zinc. It has a brilliant white color and is usually shipped in ingots, which, if possible, should be stowed on a good even floor to prevent breakage. It has been recommended that, if the weight of the spelter will allow it without affecting the vessel's stability, the best place to stow it is at one end of a 'tween deck.

Spent mixed acid.—A corrosive liquid. See Dangerous Goods.

Spent sulfuric acid.—A corrosive liquid. See Dangerous Goods.

Sperm oil.—Stowage as for fish oils.

Spermaceti.—A white, brittle, fatty substance, an animal wax, contained in solution in the head of the sperm-whale. It is usually packed in cases and is shipped chiefly from Chile and the United Kingdom. Stowage as for waxes.

Spices.—These are vegetable products which are fragrant, aromatic, or pungent, such as allspice, cinnamon, cassia, nutmegs, mace, cloves, caraway, and ginger, most of which are dealt with under their respective names. They must be treated as choice freight and stowed well away from damp or objectionable goods and goods likely to be damaged by the scent of spices.

Spirits of nitroglycerin.—An inflammable liquid. See Dangerous Goods.

Sponges.—Shipped in bales, barrels, and sometimes in baskets, from Mexico, the Bahamas, and Cuba. If not thoroughly prepared, they may have an objectionable smell, which must be taken into account when selecting the place of stowage.

Spruce gum.—Shipped from Canada. See Gums.

Squibs, electric or safety.—These are classed as explosives. See Dangerous Goods.

Squirrel skins.—Shipped in bales chiefly from U. S. S. R. See Furs, also Skins.

Starch.—Should be stowed as dry goods, well away from wet or moist goods and from all ammoniacal cargo, such as saltpeter, soda, and potash. Starch will absorb moisture from any wet cargo stowed near it.

Staves.—Frequently used for broken stowage or dunnage in a mixed general cargo. When used for this purpose, every effort should be made to keep separate different shipments to avoid mixing which will cause confusion when discharging. One way to do this is to confine each shipment of staves to a single compartment.

Stearin.—A white, crystalline compound contained in many animal and vegetable fats. It is sometimes used in the manufacture of mar-

garine and has a disagreeable sickly flavor. It is shipped in barrels and bags and requires no special stowage.

Steatite.—See Talc.

Steel.—See Iron and Steel.

Steel billets.—See Iron and Steel.

Steel rails.—See Rails.

Stibnite.—The most important ore of antimony. See Antimony ore.

Stick lac.—See Lac.

Stramonium.—A narcotic poisonous weed of the nightshade family. Shipped chiefly from Italy, Yugoslavia, and U. S. S. R. Dry stowage, away from moist, oily, and odorous cargo.

Straw.—Classed as a hazardous article, as it is readily ignited by external sparks. See Dangerous Goods.

Strawbraid and strawplait.—Much of this commodity is exported from Japan and China for hat making, etc. It is packed in bales and lightly made cases. Pressure will injure the braid and give rise to claims, therefore careful stowage is necessary. As a rule, no other cargo should be stowed on top of it.

Strontium arsenite, solid.—A poisonous article. See Dangerous Goods.

Strontium chlorate.—An oxidizing material. See Dangerous Goods.

Strontium nitrate.—An oxidizing material. See Dangerous Goods.

Strychnine and salts thereof, solid.—Poisonous articles. See Dangerous Goods.

Styphnate of lead.—Explosive. See Dangerous Goods.

Styrax.—A balsam, exported chiefly from Italy, Honduras, and Turkey. See Balsams.

Sugar.—See Sugar, chapter IX.

Sulfates.—The salts of sulfuric acid. Both sulfate of soda and sulfate of potash are commonly shipped in bags. They should be stowed as ordinary bagged cargo, but must be carefully handled as they give off a dust which may damage other goods. For sulfate of ammonia, see Ammonium sulfate.

Sulfur (brimstone).—A mineral substance shipped in large quantities in bulk, bags, and barrels, chiefly from Texas, Sicily, and Spain. It is dangerously inflammable and readily fusible by heat. Will ignite by friction. When burning, gives off sulfur dioxide, a suffocating gas. It must not be stowed with carbon, charcoal, lampblack, fats, oils, chlorates, phosphates, phosphorus, or other carriers of oxygen. In the presence of carbon, charcoal, lampblack, and other carbonaceous substances, and fats and oils, it may produce spontaneous heating and ignition: while with chlorates, phosphates, phosphorus, and other oxygen carriers, it may produce explosive mixtures. Sulfur is classed as a hazardous article. See Dangerous Goods.

If a part cargo of sulfur in bulk is being loaded with general cargo, proper precautions must be taken to protect other cargo from the sulfur dust. If the holds are being washed out preparatory to loading sulfur, fresh water should be used, as salt water leaves a deposit which in combination with the sulfur, effects corrosion of the ship's plates and steel work.

Sulfur chloride (*mono and di*).—A corrosive liquid. See Dangerous Goods.

Sulfur dioxide.—A compressed gas. See Dangerous Goods.

Sulfur trioxide.—A corrosive liquid. See Dangerous Goods.

Sulfuric acid (*oil of vitriol*).—A corrosive liquid. See Dangerous Goods.

Sulfuric acid, fuming.—A corrosive liquid, dangerous as a fire hazard. See Dangerous Goods.

Sumac.—The powdered leaves of a shrub used for tanning and also as a yellow dye. Shipped largely from Italy, Syria, and Australia. It is usually carried in bags or bales and has a rather sickly smell, especially after having been loaded for some time. It readily absorbs moisture, therefore should not be stowed near moist or wet goods. When carried in bags, it throws off a dust when being handled, and other cargo likely to be damaged should consequently be well covered.

Sunflower seed oil.—The oil obtained from sunflower seeds. Shipped in barrels and drums chiefly from Argentina and U. S. S. R. See Vegetable oils.

Sunflower seeds.—Usually shipped in bags. See Seeds.

Sunn fiber (*san fiber or Bombay hemp.*)—Shipped in bales from India. See Fibers.

Superphosphates.—Phosphate treated with sulfuric acid and used as a soil fertilizer. The vapor from superphosphates will attack foodstuffs and render them unfit for use.

Sursee, shursee, or surson.—Native Indian names for mustard seed, which see.

Syphon bottle charges (*carbon dioxide syphon bulbs*).—Classed as a noninflammable gas. See Dangerous Goods.

Tagua nuts (*corozo nuts*).—See Corozo nuts.

Talc.—A soft compound of magnesium and silica. Massive varieties are known as soapstone and steatite. It is usually shipped in ground or powdered form in bags, which should be given ordinary dry stowage. Exported chiefly from France, Italy, China, Japan, India, and Canada.

Talki gum.—See Gums.

Tallow.—An animal fat widely used in the manufacture of soap, candles, etc. It is usually shipped in barrels, although some is shipped from China in tin-lined cases. Should be stowed in a cool place, well away from the heat of the engine room, and not on top of or close to goods which might be damaged by leakage of the tallow.

Tamarinds.—The fruit of the tropical tamarind tree, a flat brown pod with soft, acid pulp, used in the manufacture of condiments. Dry tamarinds in bags and boxes require no special stowage, but wet preserved tamarinds in casks should be given wet stowage.

Tankage.—The dried product of garbage and of animal sweepings, used as a fertilizer. It is shipped in bags and cakes principally from Argentina, Brazil, Uruguay, Australia, and New Zealand. Has an offensive odor and should be stowed away from goods likely to be tainted, also away from fine goods generally which might be damaged by the dust given off by tankage, which is hard to remove. See also Dangerous Goods, as certain tankages, being subject to spontaneous heating, are classed as hazardous articles.

Tank cars, empty.—Classed as hazardous articles when they have previously carried inflammable liquids, etc. See Dangerous Goods.

Tank trunks, empty.—See Tank cars, empty.

Tapioca.—A starchy substance obtained from the cassava or manioc plant. Should be stowed well away from all scented or odorous goods which might cause tainting. It is likely to heat and should therefore be well dunnaged to permit air circulation, and should be adequately ventilated during the voyage.

Tar.—Tar is inflammable and has a pungent smell which will damage foodstuffs and other fine cargo. There is also considerable danger of leakage. See Dangerous Goods.

Tara pods or sheaths.—The pods from which tara powder is made by crushing. Shipped in bags from Peru and should be given ordinary dry, clean stowage.

Tara powder.—A powder made from the dried pods of a Peruvian tree, and used in tanning. It is shipped in bags and should be given good, dry stowage. It has a very slight odor, somewhat like sawdust.

Tares.—A forage crop also known as vetch. Stowage as for seeds.

Tartaric acid.—Colorless, odorless crystals, which may be considered as a foodstuff and stowed accordingly.

Tea.—Tea is one of the most delicate cargoes carried from the Far East and must be stowed well apart from all odorous and moist goods such as copra, cassia, essential oils, sugar, turmeric, and hides. Before loading tea, the holds should be prepared by removing all oil and other stains on the tank-top ceiling and elsewhere, using if necessary a caustic solution and afterward coating with limewash. Bilges should also be thoroughly cleaned and deodorized by chloride of lime, and then coated with cement-wash. Holds should be thoroughly dried out and ventilated before commencing to lay dunnage. A common practice in vessels coming from the Far East and Burma is to leave sufficient suitable space, or use space occupied by cargo to be discharged in Ceylon, and then fill this with tea for European ports.

Tea dust.—This is usually packed in bales, which should be given ordinary dry stowage. It is of no great value.

Tear gas candles.—See Dangerous Goods.

Tear gas cartridges.—See Dangerous Goods.

Teaseed oil.—Obtained from a tea plant grown in China and Japan for its seeds which, when pressed, yield a high percentage of oil, which is used as a salad oil. Usually packed in 5-gallon cans which as a rule should be stowed in the poop or other isolated compartment because of possibility of leakage. Do not stow near tea. See Vegetable oils.

Teel (til) seed.—See Sesame seed.

Tejus lizard skins.—Shipped in bales from Brazil. See Skins.

Tequila.—A distilled liquor shipped from Mexico, usually bottled in cases. See Alcoholic Liquors, in section on stowage of special cargoes.

Terra Japanica.—This is a name sometimes given to gambier and catechu because these commodities were originally shipped to Europe by way of Japan.

Tetrachloride (silicon chloride).—A corrosive liquid. See Dangerous Goods.

Tetraethyl lead, liquid.—A poisonous article. See Dangerous Goods.

Tetrazene (*guanyl nitrosamio gaunyl tetrazene*).—Explosive. See Dangerous Goods.

Tetryl.—Explosive. See Dangerous Goods.

Textile waste.—A hazardous article. See Dangerous Goods.

Thallium salts, solid.—Poisonous. See Dangerous Goods.

Thallium sulfate, solid.—Poisonous. See Dangerous Goods.

Thyme.—A plant which yields an essential oil. Shipped chiefly from Syria and North Africa. The powdered roots are also shipped in bales and should not be stowed with goods liable to be tainted by their odor.

Thyme oil.—An essential oil exported from Morocco, Spain, and France. See Essential oils.

Ties, railroad.—Railroad ties are usually impregnated with creosote to preserve them against weather and the attacks of insects, and for this reason they should not be stowed in or near a compartment containing fine goods or foodstuffs. After creosoted ties have been discharged, great care should be taken to remove all traces of the creosote and its fumes, if grain or other cargo subject to damage from taint is to be loaded. A common practice is to stow ties and other creosoted lumber on a bed of sawdust which serves to absorb any drainage of creosote. See Creosote.

Steel and iron railroad ties are widely used, particularly in tropical countries, and are usually nested for shipment.

Timber.—See Lumber, chapter IX.

Timbo root.—See Cubé root.

Timbo root powder.—A powder made from timbo roots. It is shipped in cases chiefly from Brazil, and Peru, and should be given dry, clean stowage.

Timothy seed.—The small seed of a grass, which is usually packed in close-woven bags. Care must be taken to guard against the slightest chafing, as the smallest of holes will permit the seed to escape. See Seeds.

Tin.—Usually shipped in ingots and exported in large quantities from Penang, Singapore, Netherlands Indies, Nigeria, and Bolivia. It is recommended that ground space be reserved for tin and, because of its value, it must be very carefully tallied on board and guarded in the hold until well covered up with other cargo.

Tin barilla.—Grains of native tin occurring in ore. Usually shipped in bags. Requires dry stowage, away from foodstuffs, because of sifting.

Tin ore.—Also known as cassiterite. See Ores, chapter IX.

Tin plates.—These are thin sheets of iron covered with tin. Care must be taken to avoid distortion of the plates and rusting. It is recommended that they be loaded by means of airplane or platform slings, in order to prevent crushing. In the hold they should be stowed flat, perfectly level, and firm, particularly at the turn of the bilge, where plenty of dunnage should be used. To prevent rust damage, tin plates should be loaded only in dry weather, should not be stowed on a wet or damp ceiling, and should be thoroughly protected against damage from condensed moisture. See chapter VIII, "Damage from Temperature Changes During the Voyage," for suggestions regarding ventilation.

Tin tetrachloride.—A corrosive liquid. See Dangerous Goods.

Tincal.—Crude or native borax, which see.

Titanium tetrachloride.—A corrosive liquid. See Dangerous Goods.

Tobacco.—Leaf tobacco is usually carried in hogsheads, cases, and bales, and is shipped in large quantities in oversea commerce, being exported by the United States, Netherlands Indies, Turkey, and other countries. It is likely to heat, sweat, and become moldy, and for this reason it should be stowed well away from wet or moist goods that may heat and throw off moisture. Adequate ventilation is necessary during the voyage. Tobacco is also easily damaged by taint, and consequently should be stowed away from turpentine, oils, valonia, etc. The odor of tobacco will damage fine goods and foodstuffs, and should be kept away from such cargo. Tobacco packed in bales, such as that shipped from Turkey, should be well protected against possible chafing.

Tolu, balsam.—Shipped in cases chiefly from Colombia and Canada. It is odorous and should be stowed away from edibles and foodstuffs. See Balsams.

Toluene and toluol.—Inflammable. See Dangerous Goods.

Tonka beans.—The seeds of a large South American plant. They have a pleasant vanilla-like odor, due to the presence of coumarin, and are used for flavoring tobacco, in perfumes, and for making artificial vanilla extract. Should be given dry stowage away from odorous goods, and from foodstuffs which might be affected by the fragrant odor of the beans. Usually packed in barrels and are exported chiefly from northern Brazil, Colombia, Venezuela, and Trinidad.

Torpedoes (cap, explosive, railway, etc.).—These are classed either as fireworks or explosives. See Dangerous Goods.

Tortoise shell.—See Shells.

Tow.—Waste hemp shipped in bales. Stowage as for hemp.

Tracer fuzes.—Explosive. See Dangerous Goods.

Tragacanth.—See Gums.

Tragasol (locust bean gum).—Shipped chiefly from Greece, Italy, Malta, Cyprus, Egypt, and Morocco. See Gums.

Trefoil seeds.—A variety of clover seed. See Seeds.

Trepang.—See Bech-de-mer.

Trinitrobenzene.—Explosive. See Dangerous Goods.

Trinitrobenzene, wet.—An inflammable solid. See Dangerous Goods.

Trinitroresorcinol.—Explosive. See Dangerous Goods.

Trinitrotoluene.—Explosive. See Dangerous Goods.

Trinitrotoluene, wet.—An inflammable solid. See Dangerous Goods.

Tripe.—A part of the stomach of animals such as cattle, used as a foodstuff. Shipped in barrels largely from Chile. Usually stowed in lower hold away from foodstuffs or other commodities subject to contamination. Handled as wet cargo and has an odor.

Tripoli.—A porous, silicious rock, used in the manufacture of abrasive polishes, scouring soaps, filtering mediums, etc. Shipped in bags from southern United States ports. Dry stowage.

Tuba root.—See Derris root.

Tucum kernels.—Obtained from the Brazilian tucum palm tree and yield an oil that is used in soap making, as a lard substitute, etc. See Nuts.

Tuna fish.—Canned tuna fish is shipped in considerable quantities from Japan and Hawaii. See Canned goods.

Tung oil.—See China wood oil.

Tungsten ore.—The ore from which the metal tungsten is obtained. Also known as wolfram. Shipped in bags and has a fairly high value. Exported chiefly from China, Chile, Argentina, and British Malaya and requires no special stowage. No hooks should be used in handling. See Ores.

Turkish millet.—See Durra.

Turmeric.—The root of an East and West Indian plant of the ginger family, used as a condiment, yellow dyestuff, etc. Exported chiefly from Haiti, India, and Japan. It is usually shipped in bags, has a strong odor, and gives off dust. Stowage should be planned to protect other cargo from the odor and dust.

Turpentine.—A resin obtained from the pine tree and other coniferous trees. Shipped very largely from southern United States ports in cargoes of what are usually described as "naval stores," consisting principally of turpentine, resin, and lumber. It is classed as a combustible liquid. See Dangerous Goods.

Turpentine and its vapor are highly inflammable and every care must be taken to prevent sparks coming into contact with it. For the same reason, it should be stowed as far as possible from all goods liable to spontaneous combustion, and well away from bunker bulkheads.

The odor of turpentine is penetrating and pungent and, therefore, it should be stowed well away from any goods which is subject to damage by taint. It is recommended that turpentine should be separated by the engine and boiler-room space from flour, tea, and other damageable foodstuffs.

Turtle shell.—See Shells.

Tutenague.—An Indian name for crude zinc, also the name of a metallic compound called Chinese copper which is shipped from China. Requires no special stowage.

Twine (binder).—Twine made of sisal hemp and similar fibers, which is used in harvesting machines for binding sheaves of grain. It is somewhat oily and should not be stowed over fine goods.

Umber.—A brown ore shipped in bulk and bags, chiefly from Malta, Cyprus, and the United Kingdom, and used as a pigment. See Ores.

Uranium ore.—The ore from which the metal uranium is obtained. Usually shipped in bags. See Ores.

Uricuri kernels.—Yield an oil which is used for the same purposes as coconut oil. Shipped from Brazil. See Nuts.

Uva-ursi leaves.—The leaves of the bearberry plant, which are used medicinally. Shipped in bags and are exported from Spain and Portugal. Dry stowage as for leaves.

Valerian roots.—The dried roots of the valerian plant, which contain a volatile oil used as a nerve tonic, and in incense and perfumery. Usually shipped in bags, which should be given clean, dry stowage, away from oily, moist, or odorous goods.

Valonia.—Acorn cups shipped in bags and bulk chiefly from Turkey and the Levant, and used in tanning. Likely to heat and sweat. Gives off a reddish-yellow dust, and should be stowed well away from fruit, tobacco, and other goods likely to be injured by heat, moisture,

or dust. Valonia has been known to injure tobacco seriously. Should be well ventilated during the voyage.

Vanadium ore.—An ore shipped chiefly from Peru and Rhodesia, usually in bags. See Ores, in chapter on Stowage of Special Cargoes.

Vanilla beans.—The cured pods of a plant indigenous to Mexico and shipped from that country, but now also cultivated in several parts of the Tropics, notably in Java, Seychelles, Mauritius, and Ceylon. Should be given dry stowage, away from all odorous goods.

Varnishes.—These are classed either as combustible or inflammable liquids, according to their composition. See Dangerous Goods.

Vaseline.—Should be stowed in a cool place and away from dry goods, as it melts with heat.

Vegetable fats.—See Fats, vegetable.

Vegetable ivory.—See Coquilla nuts, Corozo nuts, and Nuts.

Vegetable oils.—Vegetable oils of many kinds are shipped in oversea trade, packed in barrels, drums, cans in cases, and in bulk. The more important kinds, most of which are dealt with herein under their respective names, are arachis (ground nut) oil, castor oil, China wood or tung oil, colza (rape) oil, coconut oil, cottonseed oil, linseed oil, Nigerseed oil, olive oil, palm oil, palm-nut oil, sesame (gingelli) oil, sunflower-seed oil, and soybean oil. Leakage must always be guarded against, and for this reason containers should be carefully inspected at the time of loading, and faulty containers rejected or recoopered. None of the commercial vegetable oils are dangerously inflammable, but if stowed so they will contact fibers such as jute, hemp, and cotton, or sawdust, rags, or textile goods, there is danger of spontaneous combustion, particularly in the case of linseed oil. These oils are being carried increasingly in bulk, usually in a deep tank constructed with this purpose in view. Shipment in bulk eliminates packing costs and the leakage that is almost inevitable with this class of goods, particularly in view of the fact that it is a widespread practice to use second-hand containers.

The tanks used for vegetable oils should be tight, clean, and isolated from the ship's pumping and filling systems by blank flanges. When edible oils are carried, there must be no trace of metallic or bituminous paint or other protective covering, as these materials would contaminate the oil.

Tanks which have held fuel oil can be used for carrying vegetable oils if they are scrupulously cleaned. According to Thomas (Stowage, pp. 252–253) the cleaning process is generally along the following lines:[1]

Cleaning.—After removing as much of the fuel oil as possible, the tank should be steamed for 24 hours, then washed down with hose as soon as possible after opening up and while the oil deposit is hot—which operation, if in ballast, or so laden that cargo is not stowed in close proximity to the tanks which are to be steamed, is best done at sea owing to the difficulty of disposing of the oily water in harbor. The tanks should then be filled for testing, afterwards emptied and again submitted to further steaming for 12 to 18 hours, and again washed down with hose, as before, then wiped down by hand with Oki, Okite, or other strong caustic preparation, after which the sides, floors, etc., are to be thoroughly scraped. When the foregoing is done to the satisfaction of the surveyor, the whole of the tank is to be wiped over with the kind of oil to be carried (in some cases the meal is used) a supply of which is usually furnished by the shippers.

[1] Thomas, R. E. Stowage. Brown, Son & Ferguson, Ltd.: Glasgow, 1928.

In the case of tanks which have been in use only for general cargo or like purpose, the operation of cleaning the tank is not so drastic, and the steaming process will likely not be necessary, but in all cases, in order to eliminate all grounds for claims for contamination, etc., it is necessary that the shippers and the surveyors called in to certify the tanks as fit to receive and carry the oil be satisfied in all respects and the latter's certificate to that effect obtained before any oil is shipped.

Since some vegetable oils solidify at ordinary temperatures, the tanks used for their carriage must be fitted with heating coils to liquefy the oil when it is to be pumped out upon arrival at destination. Usually, the oil is pumped out by the consignee's own equipment. What the pumps cannot remove is collected by hand and put in barrels, which should be supplied by the consignee.

SOLIDIFYING POINTS OF VEGETABLE AND ANIMAL OILS

Oil	*Solidifying point (Fahrenheit)*	*Oil*	*Solidifying point (Fahrenheit)*
Arachis (ground nut)	20–26	Neatsfoot	32–50
Castor	0–2	Olive	23–30
China wood or tung	37.5	Palm	75–105
Colza (rape)	20–24	Palm nut	78–86
Coconut	60–70	Seal	26.5
Cottonseed	53 (partial)	Sperm	32
Lard	25–42	Soybean	10.5
Linseed (hemp)	5–17	Whale	30
Menhaden (fish)	25		

Vegetable waxes.—See Waxes.

Vellum.—A fine kind of parchment used for bookbinding, etc. It is usually packed in tin-lined cases, which should be given careful stowage as the commodity is of considerable value.

Verdigris.—The green rust of copper, or a green crystallized substance obtained from copper, used as a pigment in dyeing. It is poisonous and should be carefully stowed away from foodstuffs.

Vermicelli.—A form of macaroni. Should be stowed with dry goods, well away from damp or odorous goods and green or fresh fruit, which will seriously damage the quality of vermicelli.

Vermilion.—A bright-red pigment obtained by grinding cinnabar to a fine powder. Dry stowage, as for cinnabar, which see.

Vermin exterminators.—See Insecticides, liquid.

Vetiver oil.—An essential oil used in making perfumes. Shipped largely from the Netherlands Indies, French Africa, and France. See Essential oils.

Vicuna skins.—The skins of the vicuna, which have a fine and valuable fur. Shipped in bales from Chile and Peru, and should be given careful stowage. See Furs.

Vinegar.—A form of acetic acid. When packed in bottles in cases, it requires ordinary stowage as for bottled goods. When shipped in barrels, it should be given good barrel stowage well away from articles which it might damage by taint or leakage.

Viscacha skins.—A fur skin shipped from Argentina, usually in bales. See Furs.

Vitriol, oil of.—See Sulfuric acid.

Vitriol, green.—See Copperas.

Vomica nuts.—See Nux vomica.

Wallaby skins.—The skins of a small kangaroo, shipped from Australia. See Skins, also Furs.

Walnuts.—Shipped in bags chiefly from Italy, Rumania, Syria, Chile, Japan, and France. See Nuts.

Walnut meat (shelled walnuts).—Usually packed in cases, which should be stowed in a cool, well-ventilated place, well away from engine and boiler-room bulkheads.

Waste, cotton.—See Cotton waste.

Waterproofed clothing.—See Oiled textiles.

Wattle bark and extract.—An extract used in tanning. Shipped in bags from East Africa and South Africa. Dry stowage. See Barks.

Waxes.—Various waxes are shipped in oversea commerce, important ones including beeswax, carnauba wax, Japan wax, paraffin wax, white and yellow wax from China, and wool wax. All waxes should be stowed in a cool place, as they melt and run when subjected to heat. Refined waxes, moreover, are frequently shipped in the form of slabs and, if these are heated and softened so that they adhere to one another, there is likely to be sufficient damage to cause claims. Many manufactured liquid waxes are classed as combustible liquids. For these, see Dangerous Goods.

Whalebone.—Shipped in cases and bundles. A valuable commodity, and should be stowed in the ship's special cargo locker, away from greases, oils, and acids.

Whale oil.—See Fish oils.

Wheat.—See Grain, chapter IX.

Whisky.—See Alcoholic Liquors, chapter IX.

White lead.—See Paints.

White wood oil.—See Eucalyptus oil.

Whitening (whiting).—A substance like chalk, but softer, used as a covering medium for ceilings, etc. It is usually shipped in barrels or bags, and should be given dry stowage. Nearby goods should be protected against the dust given off by whitening during handling.

Wines.—See Alcoholic Liquors, chapter IX.

Wire, barbed.—Usually packed on reels, which should be kept apart from oils and wet cargo. The reels are very useful for filling broken stowage and are commonly used for this purpose.

Wire, galvanized.—This and bright wire are usually packed in coils covered with burlap, and should be kept dry and carefully stowed to keep the coils from being crushed.

Wire netting.—Is commonly packed in rolls which may be used for filling broken stowage, but should not be overstowed with heavy goods or other articles that would crush the wire.

Wire rope.—See Rope.

Witherite.—A heavy mineral sometimes mistaken for lead ore because of its weight; also called barolite. See Ores.

Wolf skins.—Shipped in bales chiefly from U. S. S. R. See Furs, also Skins.

Wolfram.—An ore from which tungsten is obtained. See Tungsten ore.

Wood filler, liquid.—A combustible liquid. See Dangerous Goods.

Wood oil.—See China wood oil.

Wood pulp.—See Pulp.

Wood shavings.—A hazardous article. See Dangerous Goods.

Wood stain, liquid.—Frequently an inflammable or combustible liquid. See Dangerous Goods.

Wool.—Wool is an important cargo and is shipped from a number of countries, the principal ones being South America, Australia, New Zealand, South Africa, United States, and North China. The sizes and weights of the bales used in the different countries vary greatly. Argentine and Uruguayan bales vary from 700 to 1,000 pounds in weight; New Zealand bales from 280 to 400 pounds; South African bales from 300 to 900 pounds; Indian bales from 300 to 400 pounds; and Chinese bales from 400 to 700 pounds.

Wool is shipped in two conditions, as wool in the grease (greasy or unscoured wool), and as clean or scoured wool. The two kinds should not be stowed together, as the scoured wool is likely to be damaged by the greasy wool.

There is considerable danger of fire when wool is being carried. A Royal Commission appointed by the New Zealand Government in 1906 to inquire into the origin of fires on wool-carrying ships recommended "That wool should not be stowed with oil, fat, tallow, tow or flax; or in contact with packages containing such products; or in contact with other material more readily combustible than wool itself." It is further recommended that wet or damp wool should be rejected for carriage; wool should not be stowed on top of ore or moist or oily goods without thorough separation by means of planking, etc., neither should wool be stowed with or above maize or other cargo likely to heat and throw off moisture, since many claims have been paid because of sweat damage to wool, arising from the latter type of stowage.

Wool cargoes should be well dunnaged and matted, and should receive good ventilation during the voyage.

An important point in stowing wool is to see that no space is lost, and to this end the hold should be carefully measured to see which way the bales will stow to the best advantage, on their flat or their crown, or perhaps even some tiers each way, as by this method it is sometimes possible to save a large amount of space.

Wool grease.—Shipped in barrels and drums and, though not liable to spontaneous combustion, it is oily and greasy and will maintain and increase combustion if a fire breaks out. It should be given wet stowage.

Wool waste.—Classed as a hazardous article. See Dangerous Goods.

X-ray film.—When such film has a cellulose acetate base, there are no restrictions as to stowage. When it has a nitro-cellulose base, however, it is highly inflammable. See Dangerous Goods. The same applies to X-ray film scrap.

Xylene.—An inflammable liquid. See Dangerous Goods.

Xylol.—An inflammable liquid. See Dangerous Goods.

Xylol bromide.—A tear gas. See Dangerous Goods.

Yacca gum.—See Gums.

Yegoma oil.—See Perilla oil.

Yerba maté (*Paraquayan tea*).—The dried leaves of a tropical tree much used as a beverage in Paraguay, Argentina, Brazil, and elsewhere. Dry stowage, well clear of other goods which might cause tainting damage.

Ylang-ylang or cananga.—An essential oil, used in perfumery, shipped chiefly from Madagascar, Netherlands Indies, and Philippine Islands. See Essential oils.

Zedoary (zadory) roots.—The roots of a Chinese and Indian plant used in medicine and for perfumery, and also yields a turmeric. Dry stowage, as for barks.

Zinc.—See Spelter.

Zinc arsenate.—A poisonous article. See Dangerous Goods.

Zinc arsenite, solid.—A poisonous article. See Dangerous Goods.

Zinc ash.—This is likely to heat if it is wet or damp. Should be stowed in a dry place, away from all goods which may throw off moisture.

Zinc chlorate.—An oxidizing material. See Dangerous Goods.

Zinc concentrates.—Shipped in bulk and bags chiefly from Peru and Australia. See Concentrates, also Ores, chapter IX.

Zinc dust.—A powder obtained by heating and grinding zinc or by cooling volatilized zinc, and used in dye-works and in galvanizing iron. Dry stowage.

Zinc ethyl.—A colorless liquid which takes fire on contact with air. Its carriage is not permitted. See Dangerous Goods.

Zinc nitrate.—An oxidizing material. See Dangerous Goods.

Zinc permanganate.—An oxidizing material. See Dangerous Goods.

Zinc white.—Usually shipped in drums or kegs. Should be treated as wet cargo, the containers stowed on end, and well chocked off. Heavy cargo should not be stowed on top of this commodity, as it might crush the containers and cause serious leakage.

Zirconium sand.—A mineral, also known as "Zirkelite." It yields zirconia, which has great heat-resisting qualities and is used as a refractory and in the ceramic industry. It is shipped in bags, chiefly from South Africa. Stowage as for bagged ore. See Ores, chapter IX.

Zirconium ore.—Used in making certain kinds of steel. It is shipped from India, Brazil, Australia, and Egypt, usually in bags but sometimes in bulk. See Ores, chapter IX.

Zirconium metallic, dry.—An inflammable solid. See Dangerous Goods.

Zirconium metallic, sludge.—An inflammable solid. See Dangerous Goods.

Zirconium metallic, wet.—An inflammable solid. See Dangerous Goods.

Zirconium nitrate.—An oxidizing material. See Dangerous Goods.

Zirconium picramate wet with 20-percent water.—An oxidizing material. See Dangerous Goods.

CHAPTER XI

STOWAGE OF SHIP'S STORES

The stowage, care, and preservation of ship's stores is a problem distinct from the stowage of cargo, being governed in large measure by considerations that need not be taken into account by the master or ship's officers when stowing cargo. It has seemed desirable, however, to republish here the instructions for the "Care and Preservation of Supplies," contained in the United States Federal Standard Stock Catalogue, and used by the United States Navy.

CARE AND PRESERVATION OF SUPPLIES

(ISSUED MAY 1933)

[NOTE: (1) Stowage Precautions—Section II, Part 3 of the Federal Standard Stock Catalogue—have been revised and expanded herein. (2) In this revision of Stowage Precautions, all items of clothing and of provisions which heretofore have appeared in the general alphabetical list have been transferred to the main captions "Clothing" and "Provisions" where they will be found arranged alphabetically as in the Federal Standard Stock Catalogue.]

Acids.—Should be protected against high temperatures. When carried on shipboard, should be stowed on steel deck. Acids of either inflammable, combustible, or penetrating nature should, when practicable, be stowed above deck in lead-lined lockers especially constructed for the purpose, and acids which cause spontaneous combustion by contact, should not be stowed in the same compartment. Acids should be plainly labeled in such a way as to prevent their being mistaken for other material. The tops of carboys should be protected by wooden battens to prevent breakage, and stoppers of carboys should be secured to prevent spilling in handling.

Alcohol.—Should be stowed in metal tanks, and when practicable, stored in separate storerooms in order to avoid a fire hazard. When carried on shipboard, in small containers, should be stowed preferably on weather deck. Alcohol for torpedoes should be stowed in new or perfectly clean containers.

Aluminum-ware.—Should not be cleaned with lye, potash, or other strong alkali. Should be cleaned with a good neutral soap and hot water. May be kept bright by the use of steel wool and lather of good soap. If dented, should be straightened on a wood form.

Ammonia.—Should be stored so as to guard against leakage. It affects vegetable colors in textiles and should be kept isolated from other supplies.

Ammonium carbonate.—This drug deteriorates under storage conditions through loss of NH_3 and CO_2, gradually becoming opaque, and is finally converted into friable porous lumps or a white powder. Stock should be limited to six months' supply and should be examined frequently for deterioration.

Anchors and cable, chain.—Should be thoroughly protected with a waterproof coating, applied by dipping if possible, otherwise by spraying or with a brush.

Apomorphine hydrochloride.—This drug is subject to deterioration, as evidenced by change of color to green. CAUTION.—Apomorphine hydrochloride must be rejected if it at once imparts a marked emerald-green color to 100 parts of distilled water when shaken with it in a test tube. Stock should be limited to six months' supply.

Arsphenamine and neo-arsphenamine.—These drugs deteriorate under storage conditions; such deterioration is accelerated by exposure to atmospheric air and is evidenced by a change in color from bright yellow to a dull or dirty yellow color. Care should be taken to examine each ampule before use for

defective sealing and for change in color of contents. Stock should be limited to six months' supply. The sealed containers of neo-arsphenamine should be kept in a cool place, preferably not above 10° C., 50° F.

Asbestos.—Should be stowed in storerooms fitted with closed bins.

Awnings.—Before stowing, awnings should be thoroughly dry. They should be stowed in dry places. Freshly painted canvas articles should not be stowed where ventilation is poor. When stowed, they should be turned over from time to time to prevent nesting of rats.

Bags, canvas.—Should be thoroughly dry before stowing and should not be subjected to dampness while stowed.

Band instruments.—When any band instrument is not in use it must invariably be kept in the case provided for that purpose.

> Care of brass wind instruments.—Grease or oil should never be applied to valves. Valves must always be kept free of dirt. Grease should be put upon the slides, but only in very small quantities and care exercised that none gets into the interior of the instrument. Should the top and bottom caps of valves become tightly fixed, no violence will be used to remove them, but they will be held under running hot water for a short time, when they can be readily removed. The use of pliers and pincers is prohibited. Before the instrument is put away, all water should be removed, as the retention of moisture in the interior is the prime cause of corroding and eventually destroying the soldering at the joints.
>
> Care of wood and wind instruments.—The exterior should be dried with a soft cloth or chamois skin, and the ends of the joints kept perfectly dry. A swab, which is naturally an absorbent of moisture, should not be left in the bore of a wood reed instrument, as it will cause the wood to expand and split. Exposure to fog and dampness of wood, also steel springs and screws, tends to shorten the period of usefulness of this class of instruments. This is especially true at seacoast posts. Oil should be kept on the springs and screws at all times to prevent rusting. Frequent inspections must be made.

Barrels.—Should be stowed bungs up and bilges free.

Batteries, electric.—Dry batteries, for general purposes, flashlights and radio, should be stored in a cool, dry place. Should not be stowed near steam pipes or radiators, as heat causes rapid deterioration. Should not be stored in metal shelves or against metal bulkheads. If wooden shelves or bins with wooden backs are not available use a wood or other insulating lining. Stock should be limited to a ninety-day supply, and oldest stock issued first. Stock should be examined monthly; batteries showing corrosion of the zinc are unfit for use.

Storage batteries which have not been filled with electrolyte (bone dry condition) should be stowed in a dry place of normal temperature.

Storage batteries which have been filled and charged should be kept in a battery charging or service station where ventilation is adequate and the batteries can be given periodic charges and care by properly trained personnel.

Bleaching-powders.—(Used in laundries) are rapidly decomposed by water, heat, light, and air. They must be kept cool, dry, and isolated.

Bluing, laundry.—Should be protected from dampness.

Boats.—All small boats should be stowed under cover if practicable. Water should not stand in bilges, but it is excellent practice to sprinkle boat from time to time with water from a hose. Boats should be stowed so as to prevent strains, sagging, hogging, or twisting. When boats are nested, the keel of the bottom boat should rest on a heavy plank or timber, supported by sufficient blocking to prevent sagging. All boats of the nest should be stowed perfectly plumb, both bow and stem, before securing shores or cradles. Three or more shores should be fitted on each side of the boat. The second boat of the nest should rest on a heavy plank or timber to give support through the entire length of keel. This plank should be supported at intervals so as to transmit the weight to the keelson of the bottom boat. The same method should apply when additional tiers of boats are involved. Three or more shores should be fitted on each side of all boats. Cradles should not be used when boats are to be nested for a long period of time.

Brushes.—Should be stored in cool, well-ventilated room. Brushes which have hair or bristle stock should be dusted with pulverized moth balls (naphthalene), or should have a sufficient amount of naphthalene placed in each box or carton, to protect the contents from moths. They should be stowed on edge with space for air circulation underneath and through the pile. Paper wrappings

around bristles should not be removed prior to issue. Pitch or cement set brushes should not be subjected to excessive heat, which drys the setting and produces excessive shedding. Issue old brushes first because brushes should not be stored for extended periods of time.

Cable, chain. (See Anchors and Cable, chain.)

Calcium-carbide and *Calcium-phosphide.*—Should be stowed in a dry place, and when practicable, stored in separate storerooms in order to avoid a fire hazard. On shipboard, should be kept in a dry locker above decks and segregated from material of inflammable nature and located so that there will be no danger of their being exposed to moisture or in a dry storeroom containing noninflammable stores. Frequent inspection should be made to detect leaky containers, as dampness is very dangerous and water will cause spontaneous combustion.

Caps, friction, tin.—Should be examined monthly, and if found to be rusting they should be used at once, if practicable. Should not be stowed in contact with other metal articles.

Cells, battery, dry.—(See Batteries. Same precautions.)

Linoleum.—Should be kept in air-tight containers.

CEMENT:

Portland.—Should be stored in storeroom fitted with closed bins, and most carefully protected from moisture.

Rubber.—Should be kept in paint room, or other place separate from other stores.

Chloramine and *Chlorinated lime.*—These drugs deteriorate under storage conditions with loss of chlorine content. Stock should be limited to requirements for one year.

Clay, fire.—Should be stowed in storerooms fitted with closed bins, and kept free from moisture.

Cloths, hammock, weather.—(See Awnings. Same precautions.)

CLOTHING:

General precautions.—Do not stow clothing against metal walls or bulkheads, on account of moisture due to sweating. When clothing is not being issued, loose clothing should be tied up in wrapping paper to insure clean garments. Woolen clothing should be looked over in summer months and plentifully sprinkled with moth balls or naphthalene.

SPECIAL PRECAUTIONS.—

Boots, rubber.—Should not be stowed near steam pipes or radiators, as heat causes rapid deterioration.

Braid, gold.—Should not be stowed near rubber buttons or held together by rubber bands. All rubber articles and many kinds of wrapping paper contain sulfur, which tarnishes gilt or gold thread. Gilt thread will tarnish when stowed in proximity to articles giving off even an infinitesimal amount of sulfurous vapors. Nearly all rubber and a great many kinds of wrapping paper contain enough sulfur to ruin any gilt thread that may come in contact with them.

Buttons, eagle.—While in stock should be wrapped in nontarnishable paper and protected from moisture.

Cap ribbons.—Same as "Braid, gold."

Devices, cap, cooks' and stewards', and CPO.—Same as for buttons.

Insignia.—Same as for cap ribbons.

Rain clothes (oiled fabric).—Should be stowed by hanging garments from A-shaped racks. The racks should be of sufficient height to permit the garments to swing clear of the floor. Should be spaced sufficiently apart to permit free circulation of air. To avoid creasing and stickiness, garments should be removed from the packing cases immediately upon receipt, and should be hung in a place as free as possible from moisture.

Raincoats, enlisted men's (Navy), double texture with layer of rubber compound between.—These raincoats should not be removed, before issuing for use from the individual cardboard boxes in which they are packed. They should not be stored near steam pipes or radiators, as heat causes rapid deterioration.

Rating badges, gold.—Keep each badge wrapped separately in nontarnishable paper and observe same precautions as are prescribed for "braid, gold."

Service-stripes, gold.—Keep each strip wrapped separately in nontarnishable paper and observe same precautions as are prescribed for "Braid, Gold."

Coal.—Coal fires start spontaneously by the oxidation of fine particles of coal where the coal is more or less separated by coarse and fine strata, the air entering through the coarser strata acting on the finer portion, which is too dense to admit of the heat created passing off with sufficient rapidity to prevent firing. The following suggestions are offered for avoiding so far as possible spontaneous ignition in the piles:

Pile the coal in as shallow a pile as space will permit.

See that the coal is piled flat, that it is in successive layers of not more than 2 or 3 feet for the full area from slope to slope and not by continuous unloading in one place which will allow the pile to pyramid, causing the larger pieces of coal to accumulate on the outside, with the smaller coal in the inside of the pile.

See positively that there does not get into the pile any material such as oily waste, paper, straw, wood, or other material which is easily combustible.

If fire has started in a pile, try to get at the source by taking the coal out and spreading over the ground in piles not more than 2 feet deep.

Compasses, magnetic.—Magnetic compasses should be stowed in straight rows, running preferably north and south. In this arrangement compasses of each row may be placed quite near each other. Rows of compasses should not be within a distance of 2 feet of other rows. If rows run other than north and south, then compasses should be separated from each other by a distance of 2 feet. Compasses should be tested at least once a year and should be inspected to determine if any leakage occurs to cause bubbles. If bubbles appear, compasses should be filled immediately, as otherwise cards become discolored.

Containers.—Care should be exercised to guard against using as a container for one material a barrel or drum previously used for another. Such containers, when used repeatedly, should be durably marked to indicate their contents.

Cooperage.—Wooden containers, such as barrels, tubs, cases, shooks, etc., made of staves, hoops, headings, boards, should be kept dry at all times to avoid warping.

Cordage.—All twines, cord, rope, and cable made of textile material should be kept dry to avoid rotting.

Covers: Boat, painted; gun; hatch; vegetable-locker; winch.—Should not be stowed in closed compartments, and should not be folded for stowing when damp.

Covers:

Canopy.—(See Ownings and covers, boat. Same precautions.)

Furniture, canvas.—(See Bags, canvas, and Textiles.)

Searchlight.—(See Bags, canvas, and Covers, boat.)

Crockery.—Should be stowed with some shock-absorbing material between, in order to avoid breakage. It is advisable to leave crockery in the original containers until actually needed.

Dope, airship, nitrate, solvent.—Airplane dope should be stored, when practical, in separate storerooms in order to avoid fire hazard. When carried on shipboard, in small containers, it shall be stowed in chests and lockers on the weather deck when practicable. When in drums, it shall be stowed on the weather deck, when practicable, and arranged to be readily thrown overboard.

Driers.—(See Paints. Same precautions.)

Drills, carbon-steel, high-speed.—Should be wrapped in oiled-paper, and kept in dry place.

Drums, empty, paint.—Nozzles should be coated with paint, lead, red. Should be stowed with nozzle down, to prevent water standing in drum.

Duck and canvas articles, oiled or waterproofed.—Should be stowed in a cool, dry place, easily reached in case of fire. Canvas is subject to mildew and rapid deterioration unless kept perfectly dry. Canvas should never be stowed while damp. Compartments in which canvas is stowed should be dry, well ventilated, and free from rats. This class of material should frequently be inspected to prevent deterioration.

Engines, gasoline.—Cylinders and frame should be kept painted. Bright parts should be kept bright by use of oil, slushing-compound, or petrolatum. Magneto and wiring should be protected from oils and from weather, and kept free from moisture.

Ethyl-fluid.—On account of the corrosive properties of ethyl-fluid, it is impossible to so secure containers as to prevent the escape of toxic fumes. These fumes are poisonous and definitely dangerous. Consequently, ethyl-fluid should be stowed and handled so as to prevent not only actual contact with skin or clothing of handling personnel, but also to avoid exposure to the fumes. Ethyl-fluid should never be stowed in an inclosed space. It should be stowed in the open, shielded from the direct rays of the sun, or in a shed at least three sides

of which are open. This stowage space must be separated from general stowage facilities. All handling and mixing of ethyl-fluid must be done in the open, or in well-ventilated spaces, in order to avoid the danger of breathing the toxic fumes. All personnel should be warned to observe every precaution to prevent exposure to possible contact with this fluid, either directly or in blended form. Particular care should be exercised to prevent personnel from wearing clothing contaminated with ethyl-fluid, or stowing such clothing in contact with clothing to be worn. Personnel habitually engaged in handling ethyl-fluid, either unadulterated or mixed with gasoline, should be required to wear rubber gloves and white clothing, the latter in order that contact with the fluid will be apparent immediately from the resultant stain. Should any part of the skin come into actual contact with ethyl-fluid, the affected part must be washed immediately with kerosene and further thoroughly scrubbed with soap and hot water. Clothing contaminated with ethyl-fluid should be removed immediately and must not be worn again until laundering. The odor of ethyl-fluid is evidence that it is being breathed into the lungs. If it be necessary to continue work in order to stop a leak or clean up spilled fluid, a gas mask should be worn.

Explosives.—Should not be allowed in general storerooms.

Fabrics, painted or oiled.—Should not be stowed in heated rooms.

Fans, electric.—Should be stored away from electric cables to prevent possible burning out of armatures, and must be protected from all moisture.

Ferrosilicon.—The phosphoretted hydrogen gas resulting from ferrosilicon becoming damp is extremely poisonous. Instances are on record where fatalities have been caused by this gas on vessels on which ferrosilicon has constituted a part of the cargo.

Special precautions will be taken at all points where ferrosilicon is carried in store to see that this material does not become damp and to provide adequate ventilation.

Fiber-material, compressed.—Should not be stowed near a radiator, steam-pipe, etc.

Files.—Should be kept covered in a dry place.

Films.—Should be stowed in well-ventilated, cool place, especial care being taken to protect them from moisture and fire, as they are highly inflammable.

Fixtures (bathroom, toilet), porcelain.—Should be kept properly boxed or crated in sufficient packing to prevent chipping or scarring.

Flagstaffs.—Weather checks should be puttied.

Gases, compressed.—Cylinders may be stowed in the open, but in such cases they should be protected against excessive rise or fall of temperature. During winter, cylinders stowed in the open should be protected against accumulations of ice or snow. In summer, cylinders stowed in the open should be screened against continuous direct rays of the sun. They should not be exposed to continuous dampness. Full cylinders should not be stowed near highly inflammable substances, such as gasoline, oil waste, etc., and should not be placed near elevators or gangways, or in locations where heavy moving objects may strike or fall on them. Empty and full cylinders should be stowed apart to avoid confusion. Cylinders should be plainly marked with designating colors or other means of identification to indicate the gas contained therein.

Gaskets, rubber.—Should be kept free from oil or grease, and preferably stowed in water. Should be kept from exposure to light and excessive heat, and away from all nonferrous metal.

Gasoline.—Being an extremely volatile substance, when exposed to the air, even at ordinary temperatures, gives off a most inflammable vapor, and therefore requires special care in stowage and handling. Gasoline vapor is heavier than the atmosphere and settles to the floor or ground level, where a spark or flame will cause an explosion and a fire. It should be stored, when practicable, in separate storerooms in order to avoid fire hazard. It should be stowed so as to be thoroughly ventilated, the ventilation, however, to be arranged in such manner that sparks cannot be blown through the ventilators. No light with a flame should be taken in, nor match or other fire lighted near the building used for storage. Gasoline must not be stowed in leaky cans, and upon the receipt of cans of gasoline, they should be carefully examined and in every case where leaks are found the gasoline should be transferred to a tight can before being taken to the storehouse. The safest stowage for this material is in steel tanks buried in the ground and equipped with proper pumps so that the gasoline can be pumped into the reservoir of the apparatus in which it is to be used or into tight carrying cans. When the quantities handled are large enough to warrant

the expense, steps should be taken to provide such stowage tanks. Such stowage is impracticable where gasoline is kept temporarily for distribution to distant activities, and in such cases the foregoing instructions in regard to leaks, ventilation, fires, and lights, should be strictly followed. In addition, danger signs should be posted wherever this material is stowed. When carried in drums on shipboard, should be stowed on weather decks, the drums being placed on inclined racks, so constructed that in case of fire the drums, when released, will immediately fall overboard.

Glass.—Should be stowed vertically in racks and held in place with plugs of cotton waste. *Never lay on flat side.*

Glue, marine.—Should be kept in paint room, or other place separate from other stores.

Guns:

A. Large caliber.—Upon receipt of guns and mounts from 1 pounder up to the largest caliber (if not a transshipment) they should immediately be overhauled, and their condition ascertained. If found to be damaged or incomplete, steps should be taken to have them placed in first class condition for issue. Guns and mounts in store require constant attention. The gun, if stored in the storehouse, should be kept in the driest place available; if stored in the open, its breech mechanism should be removed and placed in the storehouse. A satisfactory stowage for breech mechanisms, 5 inches and above, is on transveyor platforms, using a platform for each breech-block and all breech mechanism pertaining thereto. Care should be taken to protect the mushroom and gas check pad. Breech mechanisms under 5 inches can be satisfactorily stored on steel racks or strong wooden shelves.

B. Machine guns and small arms should be stored in the driest place available in the storehouse. When received they should be examined as soon as practicable, care being taken to see that they are in a condition fit for issue. The serial numbers and marks of the machine guns should be taken and recorded. When in storage, they should be coated with slushing oil. A suitable mixture consists of one gallon raw linseed oil, one gallon lard oil, and one-half pint japan drier. They should be examined every six months, and the coating renewed if necessary. Spare parts should be kept in specially made drawers and coated with the same slushing oil and examined every six months. In preparing machine guns and small arms for shipment, their serial numbers and marks should be taken and checked against the records. Their history, as it concerns the issuing yard, should be carefully recorded.

C. Supply officers charged with the care and preservation of guns, small arms, or other ordnance material will be governed by the instructions contained in the Bureau of Ordnance Manual and by such special instructions as may be issued by the Bureau of Ordnance.

Gunpowder.—Should not be stored in or near storehouses containing other public property. (Army Regulations 1199, 1913.)

Gyro-compasses (cleaning and repair of repeater).—In order to guard against a possible cause for explosion of gyro-compass repeaters resulting from a spark passing through an explosive mixture in the repeater, the Bureau of Navigation directs that repeaters shall be cleaned with only carbon tetrachloride, and that only carbon tetrachloride be used as a solvent in making up rubber cement for repeater gaskets. All ships and stations having gyro-compass repeaters on hand are directed to flush the repeaters with warm, dry air as soon as practicable to drive off any accumulated explosive mixtures which may have developed from past overhauls where gasoline or other explosive fluids were used in cleaning or cementing repeater gaskets.

Hammocks. (See Bags, canvas. Same precautions.)

Hardware, light.—Shelves should be utilized for storing of such articles as saws, hammers, and other hand tools when loose. Cabinets capable of being securely locked should be used for the storing of smaller and more valuable articles. Such small articles as bolts, nuts, parts, etc., must be stored in bins when loose. Racks should be provided for pipes, rods, and other articles of similar character. The use of racks conserves storage space and tends to prevent the warping or bending of the articles so stored.

Horseshoes and horseshoe-nails.—On account of the weight of these and similar articles, care should be used to prevent overloading the floor capacity.

Hose:

Air, pneumatic-tool.—Should be kept free of oil.

Fire.—All water should be drained from such hose before stowing. It should be stretched once every three months and water run through it. This applies only to hose procured under Federal Specification ZZ-H-451. The woven linen fire hose with no rubber lining as commonly used on shore should not be wet at any time except when required for use at actual fire. If cotton-covered, the covering should be dry before stowing, and the hose should be kept in a cool, dry place. Should be coiled rather than folded, to prevent kinks. Should be kept free of oil.

Rubber.—(See Fiber-material. Same precautions.)

Instruments, telescopes, etc.—Fire-control instruments, telescopes, and other ordnance optical instruments should be kept in a warm, dry place, and should always be kept under observation. It is advisable to handle them as little as possible in order to avoid possible damage. They should not be exposed to dust and should be cleaned regularly. Gun-sight telescopes can be satisfactorily stored on board ship in wooden racks, the carrying pieces of which should have half-round notches in which to lay the telescope.

Iron-rods, pipes, and sheets.—Should be stored in racks and protected from moisture, which causes rust and deterioration.

Kerosene.—Army Regulations (1199, 1913) forbid stowing in or near storehouses containing other public property. Storage in separate storerooms will help avoid fire hazards. When carried on shipboard, should be stowed in metal tanks, preferably on weather decks or in small containers in paint storeroom.

Lampblack.—Should be kept carefully wrapped and confined to prevent sifting through package and damaging other goods.

Lamps, incandescent.—Lamps carried on board ship should be stowed in spaces as free from moisture as possible. Lamps exposed to dampness are subject to deterioration due to moisture attacking the basing cement which is used to secure the metal base to the glass body of the lamp. This condition tends to loosen the grip of the metal base.

Leather.—Should be stowed in a cool, dry place and inspected periodically. This article when in storage is subject to becoming moldy or too dry. When inspection discloses dampness, mold, oil on leather, or too dry, should be cared for as prescribed in AR 30–3040 and Handbook for Quartermasters, paragraph 53.

Life preservers.—Should be thoroughly dried before stowing, and kept dry. Should be stowed where convenient for use, and inspected regularly, to be assured of serviceableness in event of need.

Lignum vitae.—Should be stored wherever possible in a cool and preferably damp storage room, away from drafts. Exposed surfaces such as ends and side-chops should be properly protected with a heavy coating of shellac or enamel if the logs are to be used within a short period of time. If not, they should be coated either with tallow, heavy grease, or a coating of paraffin wax mixed with kerosene of approximately 1:1 ratio and applied with a brush when warmed up to a fluid consistency.

Lime.—Should be stowed in storeroom fitted with closed bins.

Linoleum.—Is easily cracked and broken when cold. Care should be taken that nothing is piled on top of it. The best way to stow this item is in rolls on end.

Lumber.—If not thoroughly dry, should be piled with extra allowance for air circulation. Decay, excessive checking, and warping or twisting in lumber may be prevented to a great extent by careful piling. Lumber should be closely watched. The following rules for the piling of lumber, prepared by the Department of Agriculture, should be observed in order to reduce such losses to a minimum.

A. Sawed lumber generally is dried by being piled in stacks with air spaces between the boards. In forming the stacks the boards should usually be laid flat, with strips called stickers between courses or layers. A space should also be left between each board in a layer and the adjacent board to provide for the circulation of air throughout the stack. Flat or horizontal piling may be of two kinds: (1) With the ends of the boards toward the alley—endwise piling—and (2) with the sides toward the alley—sidewise piling. The stacks should be arranged to slope from front to rear, and to lean forward so that water dripping from the top may fall to the ground without trickling down over the courses below. With either method of piling, the stacks should be so located in the yard that the prevailing winds blow through them rather than against the ends.

B. The endwise method of piling is generally adopted, although the sidewise method has certain advantages in the matter of air circulation. In endwise piling the stickers obstruct the passage of air from back to front of a

course, while in sidewise piling the passages from front to rear are clear. Water which forces its way into the pile is more efficiently drained in sidewise piling, and the likelihood of sticker rot and discoloration due to the accumulation of moisture, dust, and dirt against the stickers is lessened.

C. The bottom boards in a stack should rest on foundations, preferably of stone, cement, or metal. Pieces containing rot should never be used for foundation timbers or skids, or allowed to remain in the pile. The vicinity of the pile should be kept clear of weeds.

D. Lumber storage yards need to be reasonably well drained, or at least the contour of the ground should be such that water will not stand under the stacks after a storm. Otherwise, decay is apt to get a start and spread throughout the pile. Where the ground offers but poor natural drainage facilities, some artificial system of drainage should be employed. A top dressing of cinders has been found satisfactory in some storage yards.

E. Rules for piling lumber.—The following set of rules for piling lumber covers the more important points to be observed in the construction of foundations, shape of stack, arrangement of stickers, etc.:

(1) Foundations (endwise or sidewise piling):
- (a) The foundations should be strong, solid, and durable.
- (b) The top of each foundation should be level, and from front to back the top surface of the parallel skids should be in alignment, so that the lumber to be piled will bear equally upon each one.
- (c) The front foundation should be raised above the second, and the second above the third, to allow a slant in the stack of 1 inch to every foot.
- (d) The foundations should be spaced not over 4 feet apart, except for heavy planks and timbers.
- (e) The front foundation should be of sufficient height to provide space for free circulation of air under all parts of the pile.

(2) Lumber (endwise piling):
- (a) Skids, preferably 2 by 4 inches, should be laid on top of the foundations.
- (b) Boards of equal length should be piled together.
- (c) The ends of the boards should rest upon the front and rear skids.
- (d) A space of approximately three-fourths inch should be left between boards in the same layer.
- (e) Lumber piled in the open should have the front ends of boards in each layer slightly protruding beyond the end of the layer beneath, to give a forward pitch to the stack.

(3) Lumber (sidewise piling):
- (a) Skids, preferably 4 by 6 inches, should be placed across the foundations at about 4-foot intervals. The number of skids depends upon the thickness of the lumber.
- (b) Boards of equal length should be piled together.
- (c) The boards should be placed on the skids with about three-fourths inch between boards in the same layer.
- (d) Lumber piled in the open should have the front board in each layer project slightly beyond the board in the layer beneath, to provide a forward pitch to the stack.

(4) Stickers (endwise or sidewise piling):
- (a) Stickers should be of uniform thickness, preferably seven-eighths inch for 1-inch lumber and 1½ inches for 2-inch lumber. Their length should be a few inches in excess of the width of the pile.
- (b) Stickers should be placed upon the layer of boards immediately over the skids and kept in alignment parallel to the front of the piles.
- (c) The front and rear stickers should be flush with, or protrude beyond, the ends of the boards.

(5) Roof protection (endwise or sidewise piling): Cover boards, as a roof protection, should be laid on top of the pile, extending a few inches beyond the front and rear ends of the stack.

(6) Spacing stacks (endwise or sidewise piling): Space between the piles should not be less than 2 feet; 4 or 5 feet is preferred if yardage conditions permit.

(7) Dimensions of stack (endwise or sidewise piling): The customary width of stacks is from 8 to 16 feet. The height is governed by the size and character of the lumber and by the methods of moving it.
(8) Treated ends (endwise or sidewise piling): The ends of lumber 2½ inches thick or over, unless of the lower grades, should receive a brush treatment of paint or some liquid filler.

Machinery.—All Navy machinery turned into store by forces afloat, other than material in such condition as to be of no further value, should be placed in proper "laid-up" condition as prescribed by Manual of Engineering Instructions before the Supply Officer accepts such equipment.

Matches.—Should be stowed in a special metal locker, or else left in the original metal-sheathed cases.

Mats, collision.—Should be stowed where convenient for use.

Mines, naval-defense.—Cable should be kept oiled. Cylinders, safety, should be kept wrapped in paper, oiled, in boxes provided. Gaskets, leather, and rings, safety, should be kept in air-tight tin cans. Gaskets, rubber, should be kept in containers filled with water.

Mirrors.—Do not stow near heat, nor where sunlight will strike either the front or back.

Moth balls.—Should be kept in air-tight containers.

Motor-vehicle equipment.—(See AR 30-1055.)

Nails and spikes.—Kegs containing nails and spikes should be stowed on their sides with the heads facing the aisle so that various sizes may be readily located. A temporary ramp may be provided for the stowing of kegs containing heavy material, such as nails, spikes, horseshoes, etc. The kegs may be then rolled up the ramp, thus saving a direct lift. Care should be taken not to overload the floor capacity.

Nickel-plated articles.—Keep covered.

Oars, ash.—Should be properly supported throughout length, and leather parts should not be exposed to grease or oil. Do not stow so that there will be any twist in the blades or extra pressure on any part. Frequent inspection should be made to detect wood borers. A good protection is to dip oars when new in boiled linseed oil, but care must be taken not to get oil on leather parts, redipping periodically is necessary.

Oil.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stored in special storerooms, where there are only metal fixtures (no wood). Should be protected from sparks and open flames.

Engine, motor-cylinder.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. All barrels and cases containing these oils for general use should be plainly stenciled in large type: "KEEP OUT SALT WATER."

Fuel.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stored in compartments provided for that purpose. On Navy vessels these compartments are to be inspected in accordance with Navy Regulations Art. 1360(3).

Linseed.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Do not set leaky cans on sawdust; spontaneous combustion may result.

Lubricating.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stowed in cans, drums, or tanks, protected from sparks or other fire hazards.

Tallow.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stowed in metallic tanks as far from boilers or furnaces as possible.

Oilskins.—Must not be allowed in storerooms. Such clothing should always be hung on hook away from heat.

Packing:

Rubber sheet and strip.—Should be stowed in a cool place and away from chemicals, which by contact cause deterioration. Old stock should be used first as this item hardens with age and loses its elastic properties. Stowage rooms should be sprayed at frequent intervals to maintain the proper amount of moisture in the atmosphere. See also GASKETS: RUBBER.

Sheet.—Should not be rolled and under no circumstances should other material be placed on top of it.

Sheet, asbestos-fiber, compressed, steam.—(See Fiber-material. Same precautions.)

Steam.—Should be kept covered, and in original boxes when possible, and must not be stowed near steam pipes.

Paints.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stowed in special storerooms where there are only metal fixtures (no wood). All paints in drums should be stowed under cover, and water not allowed to stand on drums. Most ready-mixed paints give off inflammable gases.

Aluminum.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be kept at a temperature below 90° F.

Anticorrosive.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be kept in a cool, dry place.

Boot-topping.—Should be stowed in air-tight containers. When stowed on shipboard, should be kept on steel deck.

Lead, red.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be issued and used as soon as practicable, and never held in stock longer than six months.

Mixed, in drums.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stored on ends, tiered four high, and near storehouse doors, so that in case of fire they can be easily reached.

Paper.—All kinds should be stowed in a dry place and protected from moisture, dust, or dirt.

Paper, roofing.—Should always be stowed on end to prevent warping.

Plumbago (graphite, black lead, wad and mineral carbon).—Packages should be kept tight to prevent the contents sifting through and damaging other goods.

Polish, metal.—Should be kept in paint room, or other place separate from other stores. Inflammable polish is to be stored on weather deck when practicable.

Provisions:

Beverages (not including cocoa, coffee, and tea).—Packed in glass containers with metal tops or cork stoppers, should be stowed sidewise to prevent drying out of stoppers with resultant leakage and evaporation. Light is detrimental to color of any item packed in glass, and for this reason cases should not be opened until the product is to be used. This last precaution applies particularly to sales items, the appearance of which has much to do with consumer preference. Citrus fruit juices packed in tin containers are highly acid, and to avoid excessive pinholing these products should be kept in a cool, dry place.

Canned Provisions:

Fruits, canned.—Should be stowed in dry storerooms or compartments at as low a temperature as possible above 40° F. Cases should be so arranged as to permit ventilation. High temperatures and too free circulation of air cause condensation on cans, resulting in rust. Cases should not be stacked so high that the top layer is subject to excessive temperatures more prevalent near the ceiling or overhead. High temperature is the chief cause of spoilage of canned fruits, as the action of acids on the tin of the container is doubled for every rise in temperature of 18° F. Therefore spoilage from this cause is four times as great at 90° F. as at 54° F. Products packed in cans lined with "fruit enamel" to preserve color pinhole more rapidly, as the action of the acid is concentrated at the defective places in the enamel. Those fruits, such as strawberries, which contain a large number of air cells, deteriorate more rapidly, as the presence of oxygen in the can increases the action of the acid. The following table shows the normal safe-keeping period of canned fruits, together with the usual defects and the causes of such defects:

Item	Safe-keeping period under normal conditions	Defects particularly applicable to the item	Cause of defect and remarks
	Months		
Apples and apple sauce	12–15	Pinholing; air in can	Acidity; accelerates pinholing.
Apricots	15–18	Pinholing	Acidity.
Blackberries	9	Pinholing, swells, fading	Acidity, hydrogen gas.
Blueberries	9	Pinholing, swells	Same as blackberries.
Cherries:			
Black	9	Pinholing, swells, fading	Acidity, hydrogen gas.
Sour	9–12	Pinholing	Same as blackberries; pinholing more rapid if not pitted.
Sweet	12	Pinholing, swells	Acidity not as severe as sour cherries; hydrogen gas.
Cranberry sauce	12	do	Acidity, hydrogen gas.
Figs	15–18	Swells	Hydrogen gas.
Grapes	9	Pinholing, swells	Acidity, hydrogen gas.
Grapefruit	9	do	Do.
Peaches	18–24	do	Acidity; fair keeper among fruits.
Pears	24	Pinholing	Good keeper among fruits.
Pineapple	12–15	Pinholing, swells, loss of color.	Temperatures above 70° F. destructive.
Plums	9	Pinholing	Highly acid.
Prunes	6–12	Pinholing, swells	Highly acid, hydrogen gas; spoils rapidly in high temperatures.
Rhubarb	6	Swells	Highly acid.
Strawberries	6–9	Pinholing, swells, fading	Acidity, hydrogen gas

Provisions—Continued.

Canned provisions—Continued.

Meat and fish products, canned.—Canned meats usually are sterile, and while canned meat spoilage occasionally may be traced to an unsterile condition, for the most part, spoilage is due to such external conditions as moisture and heat. Canned fish, especially sardines, may not be sterile, and spoilage may be due to this cause. Both canned meats and canned fish will keep best in a moderately cool, dry stowage, and should not be frozen. The ideal storage temperature for these products ranges from 50° F. to 60° F. Higher temperatures bring about disintegration of the fats in canned meats, releasing fatty acids which attack the tin. Many items of canned seafood break down rather rapidly and for this reason should be stored for short periods only. Purchases of canned seafood should always be confined to the latest pack.

Miscellaneous canned provisions:

Baking powder, Cocoa, Coffee, Cornstarch, Crackers, Flour, Macaroni, Spaghetti, Soda	Keep well on gratings or shelving in dry storerooms or compartments under moderate temperatures, provided containers are airtight. Care should be exercised in handling these products to prevent damage to containers.
Butter, Cheese	Are excellent keepers in temperatures under 40° F., but tend to become rancid with age.
Catsup, Chili sauce	Are good keepers under normal conditions.
Cocoa	May become rancid due to the high percentage of fat if stored in temperatures above 70° F.

Provisions—Continued.

Canned provisions—Continued.

Lard Lard substitutes	Have good keeping qualities at temperatures from 28° to 34° F. and will keep fairly well under temperatures below their melting points. When these products soften due to heat, they will seldom regain their normal consistency even though exposed to chilling temperatures. Of the two products, the lard substitutes are more liable to decomposition when subjected to high temperatures.
Milk, condensed, sweetened	Requires the same storage conditions as evaporated milk, although temperatures above 70° F. bring about changes in consistency and color. Cases should be turned over at frequent intervals to prevent separation and settling of sugar.
Milk, evaporated	Is an excellent keeper when not exposed to temperatures in excess of 60° F. However, a sustained temperature of 90° F. will result in inevitable spoilage. If stowage spaces are cool and dry, this item will keep well for 15 to 24 months. In order to prevent separation of butterfat, cases should be turned over at least once a quarter, or more often if practicable.
Milk, powdered	Is a good keeper in air-tight containers if stowage spaces are dry. Skim-milk powder is a better keeper than the whole-milk powder due to the higher fat content of the latter. Temperatures above 70° F. bring about rancidity of fat content if product is exposed to air for any length of time. This product should be used as soon as practicable after containers are opened; otherwise, humidity and absorption of odors will render it unfit for use.
Oils, cooking Oils, salad	Are subject to the same storage factors as lard substitute but as a general rule are better keepers. These items should be stowed as compactly as possible and separated from dry provisions packed in sacks. Stowage on racks or gratings clear of the flooring or deck is preferable.
Oleomargarine	Requires storage similar to canned butter. However, it has a tendency to break down faster, to lose color, and take on a strong flavor more quickly than butter. Under no condition should this product be stored for long periods. Nut margarines (vegetable fats) have very limited keeping qualities, and seldom are canned. Should be kept under refrigeration at all times. Melting occurs at very low temperatures and off flavors result.
Pickles, cucumber	Tend to become soft after six to nine months, and the acid attacks the tin, oftentimes resulting in pinholing and leakage. In glass containers this product is adversely affected by light.

Provisions—Continued.

Canned provisions—Continued.

Sirups: Are excellent keepers provided cans are hermetically sealed. Commercially packed sirups and molasses depend for preservation on plasmolysis; their consistency is such that microorganisms can live only with difficulty. Therefore, excessive temperatures decrease the viscosity, resulting in a higher percentage of spoilage. In nonairtight containers fermentation sets in due to air and moisture. Corn sirup and refiners' sirup have most of the organic impurities removed in manufacture, and therefore are better keepers than sorghum sirup, cane sirup, and maple sirup, which are boiled-down saps that retain natural organic impurities and a considerable percentage of protein. Cases and cans should be handled carefully to prevent leakage.

Vegetables, canned.—The general remarks under "Fruits, canned," are applicable to these products. Many canned vegetables containing sulfur, such as corn and peas, are likely to form a black discoloration on the can provided the can is not coated on the inside with "corn enamel." This condition, while affecting the appearance of the product, does not render it inedible. The following table shows the normal safekeeping period of canned vegetables, together with the usual defects and the causes of such defects:

Item	Safekeeping period under normal conditions	Defects particularly applicable to the item	Cause of defect and remarks
	Months		
Asparagus	24	Discoloration of container.	Age.
Assorted vegetables	18	Softening	Age; will spoil as quickly as the poorest keeping ingredient.
Beans:			
Kidney	24–30	Discoloration of beans	Age.
Lima	24–30	Discoloration, softening	Do.
Stringless	24–30	Discoloration of can	Do.
With pork and tomato sauce.	24–30	Softening; attack on container by acid of tomato sauce.	Acidity.
With pork, plain sauce.	36–40	Softening	Age.
Beets	12–15	Softening, fading, springers.	Age and acidity.
Cabbage, cauliflower, brussels sprouts.	18	Softening, discoloration	Age.
Carrots	24	Softening, fading	Do.
Corn	36–60	Discoloration (sulfide of iron) where plain tins are used; flat, sours.	Action on tin of can; do not swell. Avoid storage temperature above 75° F.; bacterial action.
Hominy	36–60	Same as corn	Same as corn.
Okra	12	Fading	Age.
Peas	36–60	Discoloration, softening	Age; packed in plain tins.
Pickles (in cans)	6	Fading, swells, softening	Acid on tins.
Pumpkin and squash (in enameled lined tins).	18	Loses flavor	Age.
Pumpkin and squash (in plain tins).	9	Discoloration attack on tin.	Do.
Sauerkraut	9	Swells, softening, discoloration.	Age, acidity.
Spinach	18	Attack on tin	Acidity.
Sweet potatoes	24	Discoloration	Packed in plain tins.
Tomatoes	15–18	Attack on tin, watery, breaking of pieces.	Acidity, shaking; avoid high temperatures.

Provisions—Continued.

Confections.—Pure sugar candy or pure chocolate candy keep well under conditions outlined for sugar and chocolate. Moisture, milk, nuts, and fruits all decrease the keeping qualities of confections. Soft candies, uncooked fondants, fruit bars, creams, etc., are very poor keepers in temperatures exceeding 60° F. Chocolate stored in temperatures over 70° F. will develop a white "bloom," the result of separation of cocoa fat. Such chocolate while edible may prove to be a poor sales article due to its appearance. Chocolate candy is also subject to insect infestation.

Dry provisions:

Barley Beans, dried	All have about the same keeping qualities. Beans containing over 16 percent moisture are likely to become musty and are more liable to insect infestation. Stocks on hand should be inspected at frequent intervals for insects, mustiness, and mold. Mold will show first on seed scar. Storerooms and compartments should be dry and sufficiently cool and well ventilated to prevent sweating of product. Beans should always be piled on dunnage, with frequent inspection and turning of sacks in order to prevent spoilage or the spread of must, mold, or weevils. Bags should be stowed in rows two bags wide and cross-piled, with aisles between rows for ventilation. All beans are liable to weevil infestation; as in the case of the true bean weevil, infestation first occurs while beans are growing in the field, at which time the adult weevil deposits its egg within the pod, the larvae growing within the beans at time of harvest. If storage spaces are not free from weevils, infestation may also take place after beans are placed in storage. Insect development is halted at temperatures under 44° F.
Coffee	When in sacks, should be stowed on dunnage and so piled as to permit adequate ventilation. All green coffees, with the exception of Brazilian Santos, improve with age up to five years under proper storage conditions. Dampness softens the green beans and they become "pithy" and lose body, aroma, and flavor. Green coffee or roasted coffee (whole bean or ground) will absorb contaminating odors, such as those from paint, oils, fruits, and vegetables, with adverse effect on the natural flavors. Green coffee is subject to attack by the coffee-bean weevil, but such infestation is rare except in tropical or subtropical climates. When coffee is roasted, the cells expand to the extent that volatile constituents are released and begin to dissipate. Grinding increases rate of dissipation. For these reasons roasted coffee in sacks should not be carried in stock in excess of requirements for 45 days.
Corn meal Hominy grits	Should be stowed on dunnage in cool, dry storerooms or compartments and so piled as to permit adequate ventilation. Both of these products are very susceptible to insect infestation. Nondegerminated corn meal, commonly known as "water ground," becomes rancid after a short period of time.

Provisions—Continued.
Dry provisions—Continued.

Flour	When in sacks (buckwheat, graham, rye, or wheat), should be stowed on dunnage in cool, dry storerooms or compartments so constructed as to prevent access to rodents. Sacks should not be piled over six sacks high, as the pressure will injure the gluten. Humidity greater than 75 percent is likely to result in mustiness, especially if the temperature fluctuates greatly. Flour should be kept apart from provisions giving off distinctive odors. Rodents do not attack flour but chew and cut the bags for nesting material. Many insects attack flour. The *confusum* flour beetle is the most difficult to control, as under favorable conditions it may complete a life cycle in 30 days. It also gives the flour a musty odor. Insects can be removed from flour by the use of appropriate sieves; a 10xx silk sieve is preferable, as it will remove insect eggs as well as insects. Flour will improve with age up to 6 or 8 months and will remain in good condition for over a year under normal storage conditions. Flour packed in tins should remain in good condition for at least 18 months.
Rice	When in sacks, should be stowed on dunnage in a cool, dry place. Excessive humidity causes mustiness and increases possibilities of insect infestation. Highly milled rice stores well but under tropical conditions is likely to become infested and musty after six months. Brown rice or unmilled rice does not have all the bran and germ removed, and therefore should not be held over three months in the Tropics. In dry storage rice loses some weight through evaporation of moisture but this in no way affects its edible qualities. Insect-infested rice can be reconditioned by milling if infestation is not too pronounced. Live insects will leave rice if the product is subjected to temperatures over 125° F. On the other hand, rice can be kept free from infestation if kept at chill room temperatures. Reconditioned rice should not be returned to original storage spaces until such spaces have been fumigated.
Salt	When in sacks, should be stowed on dunnage in a dry storeroom or compartment. The product will keep indefinitely under proper storage conditions, but being very hygroscopic will cake and harden when exposed to moisture. Salt storage should be kept clean; otherwise the product will become dusty and dirty. So-called free-running salt has a small percentage of filler, such as magnesium carbonate, to keep it from caking. However, this type of product is usually packed in hermetically sealed cartons.

Provisions—Continued.
Dry provisions—Continued.

Sugar	Granulated should be stored in a dry, clean place, free from flies, ants, and roaches. As this product is a highly refined carbohydrate, 99.5 percent pure, it lacks most of the essentials necessary for insect life. With a humidity above 75 percent and temperature above 80° F., it will sweat and become hard. Mold may also grow on sacks, causing an off flavor. Stowage spaces should be clean and free from dust, as sugar may acquire a dusty flavor even when packed in double sacks. Brown sugar is subject to fermentation, mites, and caking. Powdered sugar cakes badly after three or four months.
Tea	Should be stored in dry storerooms or compartments with a relative humidity not over 75 percent. Tea will absorb odors from such products as fruits, oils, and vegetables. Dampness causes tea to become musty and sour, while extremely high temperatures destroy flavor. Rough handling breaks up the leaves. Fermented teas (black and Oolong) have superior keeping qualities and under normal conditions will keep for at least two years. Green teas should keep for one year under similar conditions.

Fresh provisions:

Bread	On shipboard, should be kept in dry, well-ventilated lockers under moderate temperature. Where excess humidity cannot be excluded, it is desirable that not more than a quantity sufficient for three days be carried on hand.
Butter	Keeps best at lowest possible temperatures under 30° F., in dark storage. It should be kept closely packed and covered and apart from other provisions giving off distinctive odors. Too much moisture, warm temperatures, nonsterile packages, paper wrappers, and salt are favorable to mold growth. Humidity above 80 percent favors mold growth. For long-period storage butter should be held in a sharp freezer below 10° F.
Cheese	Requires a temperature range of 30° to 34° F. If carried for any length of time under 30° F., the product is inclined to become crumbly. Under proper storage conditions the flavor will improve during the first year, but at temperatures above 60° F. undesirable flavors will develop due to growth of flavor-producing bacteria. Practically all cheese is paraffined to prevent loss of moisture, cracking of rind, and ingress of mold and insects. The growth of mold on the surface of well-paraffined cheese with unbroken rind is not harmful.

Provisions—Continued. Fresh provisions—Continued.	
Eggs, (fresh, storage, or processed)	Keep best in an unvarying temperature of 30° to 34° F. Storage should be dry, well-ventilated, and free from odors. The use of lime will eliminate undesirable odors, and humidity may be controlled through use of calcium chloride. To provide proper ventilation, cases should be stowed on dunnage, and quarter-inch wooden strips placed between cases in the pile. Eggs will freeze at temperatures below 30° F. If adequate cold storage is not available, stocks should be limited to immediate needs. Fertile eggs perish more rapidly than infertile eggs.
Fruits	Require chilled storage; apples in the presence of a small percentage of humidity, under temperatures of 34° to 42° F., dependent upon variety and previous storage conditions; citrous fruits in dry compartments which are free from foreign odors, under temperatures from 38° to 44° F.; bananas in a dark compartment at about 45° F. Fruit should not be frozen or kept in contact with ice. To check spoilage, bruised, or rotted fruit should be removed from proximity to good fruit. All fresh fruits should be handled with care, as broken skins increase rate of spoilage.
Meats (cured, pickled, and smoked)	Chilled preserved meats and chilled smoked meats procured for early consumption should be carried under temperatures not lower than 32° F. nor higher than 36° F., except that ham and bacon should remain in good condition under a temperature of 45° F. Frozen preserved meats and frozen smoked meats should be kept under refrigeration at a temperature under 20° F. if practicable. Frozen products should be thawed out gradually. Rapid thawing accelerates spoilage. Canned preserved meats should not be frozen. (See table of temperatures.)

Provisions—Continued.

Fresh provisions—Continued.

Meats, fresh	When procured in a chilled state for early consumption, should be carried at a temperature from 32° to 36° F. When received in a frozen condition, all fresh meats should be subjected to immediate refrigeration—beef and smoked meats at a temperature not higher than 20° F. and other items not higher than 16° F. While these temperatures are ideal, they may be difficult to maintain with existing refrigeration facilities, especially on board some of the less modern naval vessels. Chilled beef quarters and wholesale cuts should never be piled if they are to be held for several days, but should be hung on hooks, or laid on racks, to permit free circulation of air. Solidly frozen meats when held in a sharp freezer need not be hung and do not need a circulation of air to retard mold growth. In fact, at temperatures below 20° F., the more compactly frozen meats are stowed the better they will retain their frozen condition. Fresh pork should not be held at chill-room temperature for more than a week. If necessary to hold it longer, it should be solidly frozen. Meat specialties, such as livers, kidneys, hearts, etc., are comparatively short lived. They should never be stocked beyond immediate needs unless solidly frozen. (See table of temperatures.)
Milk	Should be carried only in containers which have been sterilized. Containers should be well covered. Storage temperatures should not exceed 34° F. Whenever any fresh milk is removed from the container, the remaining supply in the container should be agitated and aerated. If fresh milk is solidly frozen, it will keep for months, but there will be some separation of butterfat from the other milk constituents when thawing takes place.

Provisions—Continued.
Fresh provisions—Continued.

Vegetables: Should be stored in temperatures from 34° to 50° F., depending upon the nature of the product and the season in which produced. A fairly high percentage of humidity is advantageous. Where chilled stowage is not available, fresh vegetables should be carried in well-ventilated lockers and protected from the direct rays of the sun or other excessive heat; also ample protection against freezing should be provided. The purchase of vegetables previously held under chilled storage should be limited to immediate needs, as vegetables deteriorate fairly rapidly when taken from chilled storage. Frequently sorting of fresh vegetables and elimination of bruised and spoiled vegetables will reduce losses to a great extent. Potatoes, white, stored in large quantities, keep best at a temperature of 33° to 34° F. and with a humidity sufficient to prevent evaporation. Ventilation or aeration is essential to supply oxygen and remove carbon dioxide given off by respiration. Piles of potatoes in sacks or crates should not be unduly large for this reason. Light is inimical to good potato storage. Onions should not be stored in rooms with other food products due to their contaminating odors. Sweet potatoes are more perishable than Irish potatoes, but keep well at a temperature of 50° F. It must be remembered that all fresh vegetables are alive when in storage and continue to breathe in oxygen and give off moisture and carbon dioxide. In so doing, they are using up the food stored within themselves. The extent to which vegetables consume this food is in proportion to the storage temperature. With temperatures from 34° to 40° F. this process is retarded to the extent that the more perishable fresh vegetables will keep for two or three weeks without difficulty. Where refrigerated storage is not available, the safe-keeping period of fresh vegetables *under normal conditions* is as follows:

Item	Storage period, normal conditions	Remarks
Asparagus	4 days	Wilts and toughens.
Beans, green or wax	24–36 hours	Do.
Cabbage	15 days	Decays.
Carrots	10–15 days	Become wilted and woody.
Cauliflower	4 days	Darkens and decays.
Celery	do	Becomes wilted and stringy.
Corn on cob	48 hours	Toughens and dries out.
Eggplant	6 days	Toughens.
Lettuce (head)	36–48 hours	Becomes slimy.
Peas	24–36 hours	Toughen and wilt.
Peppers	6 days	Soften and decay.
Potatoes:		
Irish	30–40 days	Dry out and decay.
Sweet	10–20 days	Do.
Radishes	4 days	Become wilted and woody.
Spinach	30–48 hours	Becomes slimy and wilted.
Tomatoes, ripe	12–24 hours	Overripe and soft.
Turnips	10 days	Become wilted and pithy.

Provisions—Continued.

Fresh provisions—Continued.

Yeast, compressed	Will keep fairly well at uniform temperatures of 28° to 32° F. When removed from storage for use the chilled condition should be gradually reduced. Where it is necessary to carry compressed yeast for some time, its keeping will be assured if the product is frozen solid, but as freezing kills some of the cell life it is necessary thereafter to use from one-fourth to one-third more of the frozen yeast. Dry yeast should be kept in original packages, well protected and carried in cool, dry, well-ventilated storage, and inspected frequently for insect infestation.

Groceries:

Biscuits Crackers	Are subject to storage precautions listed under "Flour, bread, and miscellaneous canned provisions."
Cereals (breakfast foods)	Are dry, and many of them, particularly corn products, have practically all of the natural oils removed and rarely become rancid. Most of these products are packed in cartons hermetically sealed with wax paper, and while this covering affords some protection it will not prevent spoilage in humid climates. The cadelle and saw-toothed grain beetle can penetrate paper cartons. In tin-lined cases and hermetically sealed cans breakfast foods will keep for a considerable period.
Coconut, shredded	Although a dried product, contains a high percentage of fat and spoils readily. Should be stowed in a cool, dry place.
Condiments	Other than spices (mayonnaise, mustard, salad dressing, tomato catsup, chili sauce), packed in glass, should be handled carefully to prevent breakage and not unduly exposed to light. High temperatures cause rancidity in products containing oil. Freezing causes a separation of oils and other ingredients. Rough handling will cause separation of manyonnaise. Tomato catsup and chili sauce in glass will keep in good condition for over a year if containers remain airtight. (See Beverages)
Cornstarch	If kept dry, will keep indefinitely.
Extracts, flavoring	Are good keepers if prepared from an alcohol base. They are injured by light and evaporation. Nonalcoholic extracts are fairly good keepers but tend to lose strength after a few months.

Provisions—Continued.
Groceries—Continued.

Jams Jelly Marmalade Preserves	Are manufactured and sealed at sterilizing temperatures and are so viscous that bacteria cannot live. However, exposed surfaces are subject to mold and liquefying bacteria. In sealed glass containers these products should remain wholesome for two or three years. In cans the acid fruits eventually will eat the metal, causing swells and leaks. The more acid fruits, such as cherry, will deteriorate two or three times as fast as more neutral products, such as peach. Instructions relative to storage of canned fruits apply to these products as well.
Noodles, egg	Spoil readily on account of their egg content, and for this reason should be obtained for immediate requirements only.
Olives	Are excellent keepers under ordinary conditions, except occasional lots which are not fully fermented when packed. Subsequent fermentation may blow off the cap or result in a white deposit at the bottom of the glass container. This white deposit does not injure quality but does affect the appearance.
Prunes Raisins	And other dried fruits, keep best at temperatures under 60° F. in dry storage. These items absorb mositure very readily and excess moisture favors mold development. Heat favors insect growth. Prunes become "sugared" with age. This condition is often mistaken for mold. Sugared prunes can be reconditioned by dipping in boiling water and repacking. Insect-infested dried fruits cannot be reconditioned.
Spices	Are good keepers in dry, well-ventilated compartments. Tin containers are preferable. as the natural oils are absorbed by paper cartons. Such products should be handled with care, as damaged containers will admit air and the flavoring strength will evaporate. Some spices, such as capsicums and coriander, are readily attacked by insects.
Vinegar	Either in cooperage or glass containers, will not spoil if containers are air tight and the product was sterilized when packed. Containers should be stowed in dry storerooms on racks or gratings at temperatures above 40° F. and kept apart from sack provisions. If nonsterile vinegar is exposed to air, it is subject to bacteria growth commonly known as "mother of vinegar." Vinegar is also subject to infestation by the vinegar eel, a parasite that lives only in acetic acid. Both mother of vinegar and the vinegar eel can be removed by filtering, after which the product should be heated to 145° F. for 30 minutes and replaced in sterilized containers and sealed.

Ideal temperatures for refrigerated products.—The temperatures shown opposite each of the following items are considered ideal in that they will assure the maintenance of quality for the longest period. Where only one refrigerated space is available, it is obvious that it will be impossible to maintain the variations in temperature as between items, in which case temperatures should approximate those recommended for the more perishable products.

	° *F.*		° *F.*
Beef:		Mutton or lamb	10 or below.
Corned	20 to 25.	Pork:	
Hamburger	10 or below.	Bacon	20 or below.
Liver, kidneys, etc	10 or below.	Ham	20 or below.
Quarters	10 or below.	Loins	10 or below.
Tongue	10 or below.	Shoulders	20 or below.
Wholesale cuts	10 or below.	Poultry	10 or below.
Butter, fresh	10 or below.	Sausage:	
Cheese, cream	30 to 34.	Bologna	16 or below.
Eggs (fresh, storage, or processed)	30 to 34.	Frankfurters	16 or below.
Headcheese	10 or below.	Pork	10 or below.
Luncheon meat	16 or below.	Veal	10 or below.
Milk, fresh	Not over 34.	Yeast	Not over 32.

NOTE.—Under no circumstances should eggs in the shell be frozen. Cheese may be frozen if nesessary, but low temperatures will cause crumbling. If necessary to keep fresh milk for any considerable period, it may be frozen solid. Yeast, fresh, if frozen solid will lose one-fourth to one-third of its effectiveness.

Quicklime.—Should not be stowed in or near storehouses containing other public property. (Army Regulations 1199, 1913.)

Rags, or waste, cotton.—Should not be kept, after use, in storehouses or stowage spaces, on account of the danger of spontaneous combustion.

Rubber.—Should be stowed in a cool, dark, dry place. Stowage rooms having a tendency to dampness should be well ventilated. Insofar as practicable, rubber articles should be stowed in their natural positions, and should not be creased, tightly folded, or hung on pegs. Rubber goods should be kept free from oil and grease and should not be placed in contact with brass or copper, and under no circumstances should they be stowed in sunlight or near steam pipes. Arc lamps and other electric appliances which might generate ozone should not be used in the vicinity of stowage rooms.

Rubber-compositions, dry. (See fiber-material. Same precautions.)

Scuttle-butts.—Should be properly crated, and loose parts boxed. Should be drained.

Shellac.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Shellac, mixed, clear, will darken if stored in tin-plate containers. Stock in such containers should not be kept on hand longer than six months. Shellac, mixed, colored, is not appreciably affected by metal containers. Either type may be stored indefinitely in earthenware or glass containers. Shellac, dry, should be stowed in lockers or bins provided for that purpose. Mixed shellac containing alcohol should under no circumstances be stowed even temporarily in any but the lockers or compartments specifically designated for that purpose.

Silver.—Keep all articles covered. Should be protected from articles giving off sulfurous gases and from wrapping-paper or other articles containing sulfur. All silverware should be wrapped in nontarnishable paper, which can be procured commercially.

Soda (sodium carbonate, carbonic soda, sal soda, and washing soda).—Packages should be kept tight to prevent sifting through and damaging other goods. These articles give off moisture.

Solution of epinephrine hydrochloride.—Deteriorates under storage conditions, evidenced by brownish color of solution and formation of fine brown precipitate. Deteriorated solution unfit for use. Stock should be limited to six months' supply.

Solution of pituitary.—Deteriorates slowly even at low temperatures. In warm places deteriorates more or less rapidly in proportion to degree of warmth. Should always be stored in a cool place and limited to requirements for six months.

Spare parts, metal.—Should be oiled and wrapped to avoid rust and corrosion.

Spirit of ammonia, aromatic, and spirit of ethyl nitrite.—Subject to deterioration by loss of volatile content. Stock should be limited to six months' supply and should be replaced if stock shows marked loss of bottle contents.

Sponges.—Store in medium temperature. Heat and dryness will damage. Musty odors from sponges may affect other goods.

Tanks, gasoline.—Should be thoroughly drained and dried inside, and—if practicable—left open for ventilation and to prevent "sweating."

Tape, friction, rubber.—Friction rubber tape shauld be stored in cool places, as it is subject to rapid deterioration when stored in warm places. Stocks should be limited to requirements for 12 months.

Tentage.—Store in dry place to prevent damage from moisture. After use, should be thoroughly aired and dried before stowing. (See TR 225-15 and 225-35 for method of folding tentage.)

Textiles.—Should be stowed in a dry place and protected by wrapping paper from dust.

Tins.—Do not stow tinned material in a damp place.

Tincture of digitalis.—This preparation deteriorates slowly under storage conditions. Note the date of manufacture on label when administering this drug. Stock two years old should be destroyed and replaced. Stock should be limited to six months' supply.

Tobacco.—Should be stowed in a cool, dry, well-ventilated place; never in a cellar or other damp place. Should smoking tobacco become moldy, there is no remedy.

Tools, steel.—Should be kept covered with rust-preventive compound or petroleum jelly and kept in original packages when possible until drawn for use.

Tubes, boiler.—Should be inspected at least once a year to determine if there is active corrosion. The exterior and interior of the tubes should be uniformly covered with a suitable preservative, as follows:

For tubes in stock afloat, or ashore where the fire hazard is not first importance. On new tubes received without a preservative coating or on tubes cleaned of their previous coating, use as a preservative a mixture of 50 percent corn oil and 50 percent Japan drier.

For tubes in stock afloat, or ashore where the fire hazard is important, use standard rust preservative compound, Grade B (Navy Department specification 14-C-4).

Tubes which are to be given an additional coating of preservative in whole or in part, use a preservative similar to the coating already supplied. Never apply a fresh preservative over tubes or parts of tubes which show corrosion.

Typewriters.—Store in a dry place and with protection against excessive moisture.

Uncovered lights.—Should never be allowed in storerooms.

Utensils, cooking.—Should be wiped occasionally with oily rags to prevent rust.

Valves, pump, fiber.—(See Fiber-material. Same precautions.)

Varnish.—When practicable, should be stored in separate storerooms in order to avoid fire hazard. Should be stored in room having only metal fixtures, under equable temperature, and protected from sparks and open flames.

Wagons, carts, and other animal-drawn vehicles.—When received for storage should be knocked down for economy of space before stowing. Wheels should be stowed on edge, preferably in a rack. Beds and sideboards should be laid flat, care being used to prevent warping. Poles, doubletrees, singletrees, reach poles, and axles may be placed in racks or stacked. In either case care must be taken in stacking to prevent warping of poles, reach poles, and damage to metal parts from coming in contact with other parts.

Wax, paraffin.—Should be stored in a cool place to prevent molding.

Wire.—Should be stowed in a dry place.

Wooden-articles.—Do not stow near steam-pipes. This includes wooden tool handles, etc. Wooden handles and poles are subject to attacks from wood borers. A good protection is to dip in boiled linseed oil periodically. Wooden handles of all kinds should be stowed flat, evenly supported throughout their length to prevent bending.

Zincs.—Should not be stowed in contact with brass, copper, or steel; preferably in wooden bins.

APPENDIX

STOWAGE FACTORS LISTED

The following lists contain the weights, measurements, and stowage factors of several thousand commodities that are commonly carried today in foreign commerce and the United States intercoastal trade.

The first list comprises "United States Export and Reexport Commodities." The stowage factors contained in this list are calculated, in the manner described below, from the actual weights and over-all measurements of the commodities as packed for shipment, with no allowance added for broken stowage or the space occupied by dunnage.

The second list comprises "Commodities Loaded at Foreign Ports." Most of the commodities are imported into the United States, but some of them are seldom brought to this country and are carried by American-flag and other vessels between foreign ports. These factors are also calculated from the actual weights and measurements of the packages, with no allowance added for broken stowage or dunnage. Some additional stowage factors of commodities imported into the United States will be found in the list of "Commodities Carried in the United States Intercoastal Trade" and the list of "United States Export and Reexport Commodities," these factors representing shipments of goods transferred from an oversea to an intercoastal vessel or brought to the United States and later reexported.

The third list comprises a large number of chemical and related products, and was compiled for the use of vessels in the trade between the United States and the Far East. The stowage factors in this list are based in most cases on the short ton of 2,000 pounds and are computed from the actual weights and measurements, no allowance being included for broken stowage or dunnage. Where a stowage factor is based on the long ton, this is indicated by the letters "LT."

The fourth list comprises "Commodities Carried in the United States Intercoastal Trade." This list has been included because of the importance of this trade and for the reason that packing for intercoastal shipment very often differs from that used for foreign shipments, with the result that the stowage factor of many articles carried in the intercoastal trade differs from the stowage factor of the same goods when packed for foreign shipment. The stowage factors in this list are based on the short ton of 2,000 pounds, and an allowance for broken stowage and the space occupied by dunnage has been included.

HOW STOWAGE FACTORS ARE CALCULATED

Stowage factors, as has been pointed out above, are of two kinds: (1) a factor showing the actual space occupied by 1 long ton of a commodity as packed for shipment with no allowance added for broken stowage and the space occupied by dunnage; and (2) a factor which includes an allowance for broken stowage and dunnage. Most factors in the following lists are of the first type. It is impossible, without knowing the various kinds and amount of cargo to be stowed in a given vessel and the particular type of vessel or the manner in which the cargo is to be stowed, to know what the broken stowage will amount to on any given commodity. It has been considered best, therefore, to provide in most instances the actual measurement, which can be applied by those using the factors to any given set of circumstances.

A stowage factor of the first type is computed by dividing 2,240 pounds by the weight, in pounds, of a cubic foot of the commodity as packed for shipment.

Example.—A wooden box containing 24 1-quart cans of varnish measures 1.9 cubic feet and weighs gross 65 pounds. To determine the stowage factor, first find the weight of 1 cubic foot by dividing 1.9 into 65 pounds, which gives 34.2 pounds. Then divide 34.2 into 2,240, which gives the stowage factor or number of cubic feet occupied by 1 long ton—in this case, 65 cubic feet.

To find cubic measurement.—The formula for figuring the cubic measurement of an export shipment is as follows: Length in inches times width in inches times depth in inches, divided by 1,728 (cubic inches in cubic foot).

Allowance for broken stowage.—It is difficult to make a proper estimate of the amount of broken stowage that will occur in connection with any given commodity. The following list is included to serve as a very general guide, being taken from Taylor,[1] who states: "An effort has been made to determine the amount of broken stowage on different types of cargo. A questionnaire was sent to a number of stevedores on the Atlantic and Gulf coasts, and their answers are listed below. It will be noted that a broken stowage of 15 percent means that 15 percent of the hold capacity remains unused because there is lost space between the units of cargo. It is assumed that the space is not filled with goods for broken stowage. Some of these percentages are unnecessarily high, but are given because they were provided by the stevedores. The stowage of barrels must be very poorly done if 50 percent of the space is lost; in fact, it is difficult to think of this being stowage at all. Leaving such large allowances out of consideration, it will still be seen that there would be great economies if the commodities could be packed more tightly, or if the broken stowage spaces were filled with smaller goods."

Broken Stowage of Various Types of Cargo

Type	Percent	Type	Percent
Miscellaneous package freight (average probably 15 percent).	10–25	Bulk freight:	
Standard package freight:		Coal	0–10
Bales	2–20	Grain	2–10
Sacks	0–12	Lumber	5–50
Barrels	10–50	Stone	5–10
Hogsheads	17–25	Brick	3–5
Cases	4–20	Lard	0–5
Carboys	10–22	Salt	0–10
Drums	8–25	Pig iron	0–20
Rolls	10–25	Ore	0–20
Pails	10–40	Car material	15–35
Coils	10–25	Locomotive material	10–25

In connection with the allowance to be made for broken stowage on various commodities, the Port Captain of a well-known American steamship company states: "On newsprint, the stowage factor of 80 cubic feet to the ton commonly used is entirely too small. In laying out the vessels, we always allow 100 to 110 feet, according to the size of the rolls, for broken stowage. Likewise, for knocked-down automobiles, we allow 40 percent for broken stowage. On general cargo, we usually figure about 25 percent; steel and steel plates we leave as is, in other words, 10 cubic feet per ton, which generally works out very nearly correct."

Further in this connection, Annin, a practical and experienced shipping man, states[2] that a cargo ship's "bale capacity is roughly figured at 10 percent less (than her grain cubic capacity), and capacity for general cargo at 20 percent less than grain." In other words, about 10 percent of a vessel's bale cubic capacity is a proper allowance for broken stowage on a general cargo of miscellaneous goods. Other steamship men consulted advise that in their opinion 15 to 20 percent should be allowed for broken stowage on general cargo.

The allowance that must be made for broken stowage will be greater in No. 1 hold and the aftermost hold, since these compartments taper toward bow and stern. This necessitates leaving considerable space between the cargo and the side of the ship, this space usually being filled with dunnage. Other factors that influence the amount to be allowed for broken stowage are the class of cargo (whether subject to damage from heat, odors, staining, etc.); proximity to engine room bulkheads, order of call at various loading ports, and distribution of cargo for proper stability and expeditious dispatch at loading and discharging ports.

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[1] Taylor, Thomas R. Stowage of Ship Cargoes. Miscellaneous Series No. 92, pp. 53–54 U. S. Department of Commerce.

[2] Op. cit., p. 52.

APPLICATION OF STOWAGE FACTORS

The amount of cargo that can be placed in a vessel will vary in accordance with the skill and compactness with which it is stowed. The construction of the vessel, such as the number of pillars and web frames in the holds, the narrowing of the forward and after holds, and the amount of dunnage used, also have a definite bearing on the quantity of cargo that can be carried in any given ship.

Other factors also have an influence on the use and application of stowage factors. For example, the stowage factor of the same commodity, such as grain, seeds, and cotton, will vary in different countries and ports and in accordance with the method of packing, the time of year, and other factors. Some grains are heavier and some lighter than the same grain from a different country. The weight of grain will also vary with age and moisture content. The degree of density to which cotton and other baled goods are compressed, or the way in which bags are filled, whether full and well-rounded or slack, also causes the same commodity to have several different stowage factors. Wherever possible in the following lists, the type of packing and the weights and measurements are given, so that those using the lists will know the characteristics of the package for which the stowage factor is given.

With liquids of many kinds the weight of two full drums or barrels, each of the same size and each containing the same substance, may vary considerably owing to a difference in the specific gravity of the liquid. This difference in weight will, of course, result in the two drums or barrels having different stowage factors.

A knowledge of the stowage factor and its intelligent application is useful to steamship company employees, stevedores, ship's officers, and all others who are concerned with the stowage of cargo. The factors are of greatest service, perhaps, in connection with cargo packed uniformly and shipped in relatively large lots, such as bagged goods, baled goods, or commodities packed in barrels, drums, or uniform wooden cases. If, for example, 1,000 150-pound bags of a certain commodity are offered for shipment, and it is known that the goods stow at 60 cubic feet per long ton, a simple calculation will show that the 1,000 bags will weigh 150,000 pounds, or 67 long tons, and will occupy 4,020 cubic feet of the vessel's cargo space.

The figures in the various lists which give the weight and measurement of commodities as packed for shipment will be found useful by ship's officers and others in computing the number of bags, bales, barrels, or other uniform packages of a given commodity required to make up a ton, either weight or measurement.

For example, the gross weight of a barrel of molasses, as commonly packed, is 671 pounds and the measurement of the barrel is 12.7 cubic feet. By dividing 671 into 2,240, it is found that approximately 3.3 barrels make up 1 long ton; 33 barrels would weigh approximately 10 long tons. By dividing 12.7 into 40, it is found that about 3.1 barrels make up 1 measurement ton.

UNITED STATES EXPORT AND REEXPORT COMMODITIES

The stowage factors in the following list are calculated on the basis of the actual weights and measurements of the commodities as packed for shipment, no allowance for broken stowage or dunnage being included. The factors show the number of cubic feet occupied by 1 long ton (2,240 pounds) of the commodity named.

UNITED STATES EXPORT AND REEXPORT COMMODITIES

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Abrasive (see also specific name):							
Aggregates	Bag	None					51
Cement. (See Cement.)							
Clay	Wood barrel	do	6.7		284		53
Do	Veneer drum	do	6.7		266		56
Cloth	Wood box						89
Compound	do		3.4		116		65
Grain	Keg	None	5.3		398		30
Do	do	do	6.9		341		39
Do	do	do	8.3		406		46
Do	Bag	do	1.1		114		21
Do	do	do	1.4		114		27
Do	do	do	1.4		106		28
Do	do	do	1.5		115		29
Do	do	do	1.5		105		32
Do	do	do	1.8		116		35
Do	Drum	do	9.7		355		61
Alundum	Bag	do	1.0		101		22
Do	Keg	do	4.3		396		24
Do	Veneer drum	do	5.7		226		57
Paper and cloth	Wood box	Paper liner	11.3	35	383	348	66
Do	Bundle, waterproof paper	None	1.7	5	93	88	41
Do	Roll, waterproof paper	do	1.4	2	48	46	66
Sand. (See Sand, abrasive.)							
Wheels	Bag	do					78
Do	do	do					67
N. o. s.	Wood box		9.0		410		50
Accelerator for rubber	Drum	None					88
Do	do		4.8		131		83
Do	do		10.0		266		84
Do	do		9.0		234		87
Do	do		8.7		177		110
Do	do		9.0		175		115
Do	do		6.7		230		117
Do	Fiber drum	None	7.7		164		104
Accounting machines (see also Machines):							
Adding:							
Electric (1)	do	Packing material	16.3	75	216	83	172
Motor for above (1)	do	do	2.8	20	65	34	97
Hand-operated:							
6 machines	do	do	4.5	10	103	76	97
1 machine	do	1 fiber carton	1.8	14	50	29	80
Do	do	do	1.8	14	44	21	93
2 machines	do	2 fiber cartons	3.2	19	67	40	107

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Accounting machines—Continued.							
Billing, electric (1)	Wood box	Packing material	18.6	86	283	111	149
Motor for above	do	do	2.8	20	58	28	107
Bookkeeping, electric (1)	do	1 wood box	38.0	100	530	300	160
Do	do	Packing material	18.6	85	262	120	160
Motor for above	do	do	2.8	20	58	29	107
Bookkeeping, electric (1)	do	do	16.3	75	249	94	149
Motor for above	do	do	2.8	20	63	32	97
Bookkeeping electric (1)	do	do	17.6	106	235	124	172
Do	do	Wood box	5.8	21	86	46	149
Calculating:							
6 machines	do	Packing material	4.5	10	103	76	97
1 machine	Wood crate	Fiber carton, double	4.1	16	64	35	140
Do	Wood box	Fiber carton	2.4	18	42	18	132
Accroides. (See Resin, natural.)							
Acetate:							
Amyl, technical	Steel drum, ICC-5E, 55-gal	None	11.7	52	442	390	59
Butyl	do	do	10.7	50	440	390	55
Do	Steel drum, ICC-5E		1.2	7	42	35	65
Do	Wood box, ICC-15A	1-gal. can	.7	9	17	7	92
Do	Steel drum, ICC-5E, 55-gal	None	11.7	52	447	395	59
Do	do	do	11.7	52	442	390	59
Ethyl	Steel drum, ICC-5E	do	11.5	50	440	390	59
Do	Steel drum, ICC-5	do	1.2	7	42	35	65
Do	Wood box, ICC-5A	1-gal. can	.5	9	21	7	48
Ethyl aceto-	Steel drum, ICC-5E	None	11.7	53	503	450	52
Acetic anhydride	Steel drum, ICC-5G	do	13.5	105	585	480	52
Do	Carboy, ICC-1A	do	7.5	100	200	100	84
Acetone	Steel drum, ICC-5J	do	11.8	60	410	350	65
Do	Steel drum, ICC-5	do	1.2	7	37	30	73
Do	Drum	do	10.7		405		59
Methyl	do	do	10.7		433		56
Do	Steel drum, ICC-5J	do	12.0	60	429	369	63
Acids (see also specific name):							
Acetic	Wood barrel	do					60
Edible	do	do	13.7		504		61
Glacial	do	do	12.3		495		56
Do	Cased carboy	do	2.0		66		68
Acetylsalicylic	Wood barrel	Asphalted paper liner	7.7	22	222	200	78
Adipic	do	None	7.7		268		64

Boric:							
Crystal	do	do	12.9	30	380	350	75
Powdered	do	do					70
Do	do	do	12.9	30	360	330	80
Do	Fiber carton	12 pkgs., 16 oz. each	.7	1	16	12	97
Powdered or crystals	do	12 units of 12 pkgs., 4 oz. each	2.7	3	57	36	107
Butyric	Steel drum, ICC-5G	None	14.1	101	531	430	60
Carbolic	Wood barrel	do					60
Chromic	Steel drum, ICC-6E	do	8.5	34	434	400	44
Do	do	do	2.4	8	108	100	51
Citric	Wood barrel	do	3.4	13	123	110	60
Do	do	do	5.3		240		49
Do	do	do	7.4		240		67
Do	do	do	6.5		249		58
Do	do	do	9.7		374		58
Cresylic	Steel drum	do	11.6	53	527	474	50
Glycerophosphoric	Carboy	do	7.0	64	164	100	97
Hydrochloric	Wood barrel	do					78
Hydrocyanic	Steel drum	do					30
Lactic	Wood barrel	do					48
Naphthenic	Steel drum	do					51
Nitric	Carboy	do					94
Do	Wood box		.3		6		93
Oleic (red oil)	Steel drum	None	11.7	52	457	405	57
Oxalic	Wood barrel	do	10.0		326		65
Powder	Drum	do	2.2		50		97
Phosphate	Wood barrel	do					42
Stearic	Bag	do					50
Do	Cloth bag	do	6.1	2	202	200	68
Tannic	Wood barrel	do					299
Tartaric	do	do	9.2		354		58
Do	Wood box	2 cans, 64 lb. each	3.7	19	156	128	53
Do	Wood barrel	None	7.4		272		61
Do	do	do	8.1		272		66
Vegetable oil, fatty	Drum	do					53
Adding machines. (See Accounting machines.)							
Adding-machine tape	Carton	do	1.8	3	63	60	66
Adzes	Wood box						23
Agricultural implements	Package		4.4		208		50
Do	Crate		4.6		285		35
Do	Wood box		10.0		662		33
Do	Package		23.3		300		175
Agricultural machinery (see also specific name):							
Binder, grain, 8-ft	Wood boxes, bundles, and crates	None	86.0	623	2,626	2,003	73
Combine parts	Wood box		13.7		280		109
Combines:							
Deere, No. 36B, complete:							
Main frame side sheets	do		166.3		6,200		60
Frame channels	Crate		9.3		925		22
Motor	Wood box		27.4		1,050		58
Cylinder feeder house and all sheet metal parts	do		204.5		3,600		128
Platform windshield and reel	do		58.6		1,850		70

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Agricultural machinery—Continued.							
Combines—Continued.							
Deere, No. 36B, complete—Continued.							
Elevator	Wood box		22.5		475		107
Discharge augar	do		10.5		250		95
Right wheel	1 piece		27.0		345		176
Left wheel	do		16.0		265		134
Grain wheel	do		13.3		155		192
Front wheel	do		8.0		185		97
1 bundle of two transport I beams			2.3		300		17
Total			565.7		15,600		81
Gas-engined	Wood boxes, bundles, and crates	None	436.0	2,194	7,346	5,152	133
Drill, grain, single-disk	4 wood crates and 3 bundles	do	56.0	353	1,239	886	101
Harrow, solid-disk, 7-ft	Wood box	do	22.0	185	1,014	829	49
Harrow disks	Crate		5.0		363		31
Do	Wood box		2.6		437		13
Harrow disks, tractor:							
Frame	1 crate		24.9		1,003		56
Gangs	1 case		5.9		671		20
Total			30.8		1,674		39
Harrow disks, tractor	Wood box		11.9		663		40
Harrow plows:							
Plow	1 case		28.0		2,625		24
Fittings	do		10.7		678		35
Beams	1 bundle		.7		264		6
Total			39.4		3,567		25
Hay rake, 9-ft., self-dump, 5 machines	Wood box, crate, and 6 bundles	None	118.0	280	2,783	2,503	93
Mower, 5-ft., 2 machines	5 wood crates and 1 bundle	do	65.0	342	1,989	1,647	73
Planter, corn, 20 machines	15 wood crates and 1 bundle	do	426.0	1,827	15,012	13,185	64
Plow, 2-furrow, 12-in. (see also Plow)	Wood box	do	23.0	189	1,080	891	48
Spreader, manure	4 wood crates	do	128.0	571	2,282	1,711	126
Threshers:							
International Harvester, No. 31T, complete:							
Thresher	1 crate		467.4		6,330		167
Platform	1 case		66.5		1,995		74
Wheels	1 bundle	2 wheels	46.7		535		196
	do	do	46.7		535		196
Motor	1 case		24.5		1,029		54
Total			605.2		10,424		132
International Harvester, No. 41T, complete:							
Thresher	1 case		555.4		6,560		191
Platform	do		83.7		2,770		69

Wheels	2 bundles		93.5 (46.7 each)		1,070 (535 each)		196
Motor	1 case		24.5		1,023		51
Total			757.1		11,423		148
Self-feeder, 9-ft., 22′ x 38′	4 wood crates	None	697.0	2,344	8,283	5,939	189
Tractor, farm	Wood box and 3 bundles	do	174.0	897	5,624	4,727	69
Air chutes	Wood box		21.3		362		131
Air compressors	2 wood boxes and 1 crate	None	159.0	937	6,382	5,445	56
Do	1 wood box and 1 bundle	do	200.1	750	4,835	4,085	93
Do	2 wood boxes and 1 crate	do	79.5	572	3,338	2,766	53
Do	do	do	54.1	426	2,260	1,834	54
Do	Wood box	do	49.9	125	975	850	115
Do	do	do	19.9	80	630	550	71
Air compressors and motors	do		37.1		695		119
Do	do		18.3		300		135
Do	do		55.6		876		142
Air-conditioning equipment. (See Refrigerator equipment.)							
Airplane:							
Motors	do		92.7		900		235
Do	Case		61.7		1,003		137
Parts	Wood box		14.0		169		182
Do	do		107.0		157		1,533
Propellers	Case		22.6		240		208
Airplanes:							
Consolidated, Model PBY:							
Box 1, fuselage	Wood box	Packing material	10,120.0		24,600		933
Box 2, wings	do	do	4,040.0		17,740		509
Box 3	do	do	2,240.0		6,930		723
Box 4	do	do	150.0		2,105		160
Box 5	do	do	150.0		2,105		160
Culver	do	do	691.0		3,079		503
Douglas:							
Model D. C.-5:							
Fuselage	do	do	21,065.0		11,300		4,480
Wing box	do	do	3,354.0		8,600		862
Propeller box	do	do	600.0		1,600		830
Model 8-A:							
Fuselage	do	do	2,600.0		11,000		533
Wings	do	do	663.0		3,500		423
Lockheed:							
Model 10:							
Fuselage	Unboxed		4,323.0		5,191		1,866
Wings	Wood box		1,364.0		5,165		589
Model 12:							
Fuselage	Unboxed		4,653.0		4,868		2,036
Wings	Wood box		700.0		3,090		509
Model 14:							
Fuselage	Unboxed		7,341.0		8,137		2,036
Wings	Wood box		1,922.0		7,300		605

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Airplanes—Continued.							
North American:							
Model NA-16	Wood box	None	1,938.0		8,000		546
Model NA-44	do	do	2,620.0		10,000		589
Model NA-50	do	do	2,620.0		10,000		589
Ryan:							
Model S. C	do	do	1,070.0		4,200		574
Model S. T	do	do	583.0		2,900		448
Vultee:							
Model V 11	do	do	5,775.0		22,000		589
Model BC 51	do	do	2,160.0		10,000		487
Model P. 48	do	do	2,160.0		10,000		487
Air-pressure testing sets	do		7.0		165		95
Ajowan meal	Bag						67
Alcohol:							
Amyl	Steel drum, ICC-5E, 55-gal	None	10.7	50	426	376	56
Butyl (butanol)	do	do	10.7	50	410	360	59
Do	do	do	11.7	52	422	370	62
Do	do	do	11.7	52	412	360	64
Cane	Half hogshead	do	12.3		628		44
Do	Hogshead	do	26.7		1,339		45
Ethyl	Steel drum, ICC-5E, 54-gal	do	11.2	50	417	367	60
Do	Steel drum, ICC-5, 5-gal	do	1.2	7	41	34	66
Do	Steel drum, ICC-5E, 55-gal	do	11.7	52	419	367	63
Grain	Wood box		2.9		60		109
Isobutyl	Drum		11.7		387		68
Lorol. (See Coconut oil.)							
Methanol (methyl alcohol)	Steel drum, ICC-5E, 54-gal	None	11.5	50	408	358	63
Do	Steel drum, ICC-5, 5-gal		1.2	7	40	33	67
Do	Wood box, ICC-15A	1-gal. can	.8	9	20	6	90
Do	Steel drum, ICC-5E, 55-gal	None	11.7	52	410	358	64
Do	Drum		10.7		408		59
Do	do		11.7		408		64
Do	do		11.7		396		66
Do	Steel drum, ICC-5E	None	11.7	52	410	358	64
N. o. s	Wood barrel	do					54
N. o. s	Drum	do	24.7		900		62
Alfalfa	Bag	do	6.0		112		118
Meal	do						100
Seed. (See Seed.)							
Alka seltzer	Wood box	Bottles	2.0		87		50
Alloys (see also specific name):							
Boronic	Package		4.0		499		20
Copper base	wood box						14

Zinc	Loose						8
Sodium	Wood box						11
Almond oil, sweet	Steel drum	None	10.3	50	460	410	50
Do	Wood box	2 cans	2.0	9	91	77	50
Aloes	do		1.8		137		30
Do	do		2.1		138		34
Residue	Bag	None					68
Alum	Wood box		5.0		238		51
Do	Bag	None					40
Alumina, activated	Drum	do	11.7		400		53
Aluminum:							
Bars	Crate		4.2		125		74
Wire							55
Cable							40
Circles	Wood box						24
Coil	do		5.7		468		27
Conduit (see Conduit):							
Foil	do		3.0		200		35
Do	do		3.3		192		34
Coiled	do	Flanges and separators	3.6	32	167	115	49
Do	do	do	1.6	14	94	73	38
Rectangular	do	Separators	7.0	40	193	140	80
Do	do	do	3.2	23	101	71	70
Scrap, with gum backing	Bale	None					59
Ingots:							
Grained	Wood box	do	5.9	43	443	400	30
Notch bar	Bundle	do	1.0		100	100	23
Do	do	do	.8		90	90	20
Molding	Wood box	Separators	13.1	76	425	343	70
Do	do	do	12.0	76	356	274	75
Do							40/55
Paint	Wood box	12 cans, 1 gal. each	3.0	18	132	103	51
Do	do	6 cans, 1 gal. each	1.8	12	69	52	59
Do	do	24 cans, 1 qt. each	1.9	12	71	51	57
Do	do	24 cans, 1 pt. each	.9	8	38	25	53
Do	do	48 cans, ½ pt. each	1.0	9	42	25	53
Pigs	Loose						18
Powder	Wood box		2.8		71		90
Do	do		5.4		156		80
Do	Drum	None					31
Rivets	Wood box						70
Rod and bar	do	Packing material	6.4	64	488	420	29
Rods	do						35
Seals	Crate		6.8		107		139
Sheets	Wood box		2.8		344		18
Do	do		2.7		337		18
Do	do		3.7		337		25
Do	do		4.4		356		28
Do	do		4.5		317		32
Do	do		4.3		262		36
Do	do		4.5		268		38
Do	do		4.5		253		40
Do	do		8.7		430		46

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Aluminun—Continued.							
Sheets—Continued.							
Do	Wood box		14.1		626		50
Do	do		12.4		347		80
Circles	do	Packing material	6.7	49	552	500	27
Do	do	do	4.9	42	540	495	20
Coiled	do	do	5.4	42	529	484	23
Do	do	do	3.8	38	363	323	23
Stearate	Wood barrel	None					132
Strip, plain	Wood box		2.3		298		18
Do	do		2.6		329		18
Do	do		4.5		409		25
Do	do		4.7		417		25
Do	do		4.7		269		39
Do	do		2.7		150		40
Do	do		5.7		255		50
Sulfate	Double burlap bag	None	4.3	2	202	200	47
Ground	Wood barrel	Paper liner	9.7	25	425	400	51
Lump	do	None	9.7	24	389	365	56
Do	Cloth bag	do	3.2	1	201	200	36
Aminopyridine	Drum		4.9		153		72
Ammonia, anhydrous	Steel cylinder	None	7.0	245	395	150	40
Do	do	do	4.9	176	276	100	39
Do	do	do	2.7	110	160	50	37
Do	do	do	1.6	85	110	25	33
Do	Cast iron cylinder	do	4.8	175	275	100	39
Do	do	do	6.0	250	400	150	34
Do	Steel drum						54
Ammoniacal liquor (ammonium hydroxide)	Steel drum, 110-gal	None	25.2	220	980	760	57
Do	Steel drum, 55-gal	do	12.7	107	487	380	59
Ammonium:							
Nitrate	Steel drum	do	20.0	60	460	400	97
Do	Wood barrel	do	7.2	22	322	300	50
Do	Cloth bag	Paper liner	3.0	3	128	125	52
Sulfate	do	None	4.6	3	223	220	42
Do	do	do	2.7	2	112	110	53
Aniline colors. (See Coal-tar colors.)							
Aniline oil. (See Coal-tar intermediates.)							
Anthraquinone	Keg		8.3		173		107
Do	Drum		11.6		235		110
Do	do		12.9		237		122
Antimony metal	Wood box						19

Apple:							
Butter, canned	do	6 cans, No. 10	1.2	9	56	43	49
Do	do	48 cans, No. 3	1.6	8	63	48	55
Juice, concentrated	Wood barrel	None					56
Pectin. (See Pectin.)							
Pomace	Bag	do					131
Apples:							
Canned	Wood box	6 cans. No. 10	1.2	9	49	36	55
Do	do	24 cans, No. 2	1.0	8	39	26	57
Dried	do	None	1.7	8	58	50	66
Do	do	do	1.1		49		51
Do	do	do	.9	3	28	25	68
Do	do	do	1.3		52		56
Do	do	do	.6	3	13	10	97
Do	do	10 cartons, 3 lb. each	1.5	8	39	30	86
Do	do	48 cartons, 1 lb. each	2.5	13	64	48	90
Evaporated	do						90
Do	do		2.0		56		80
Fresh	do	None	6.8	15	160	145	95
Do	do	do	1.7		50		80
Do	do	do	1.6	9	51	42	72
Do	Wood barrel	do	6.5		150		90
Do	Basket						90
Do	do		2.7		50		124
Applicators, wood	Wood box						81/103
Apricot kernels	Bag	None					66
Do	Cloth bag	do	7.3	2	220	218	75
Apricots:							
Canned	Wood box	24 cans, No. 2	.9	6	42	30	46
Do	do	48 cans, No. 1	1.4	7	68	51	45
Dried	Wood drum	None	5.1	14	212	198	53
Do	Wood box	2 cans, 25 lb. each	1.4	12	62	50	50
Do	do		1.3		52		56
Do	do	10 cans, 5 lb. each	1.5	9	59	50	57
Arc welder, electric, portable (see also Welders)	do	None	17.2	137	774	637	49
Do	do	do	8.5	81	408	327	47
Argon gas	Cylinder	do	2.6		148		40
Armatures	Wood box		.6		17		77
Arsenate of lead	Drum		5.3		112		106
Do	Wood cask						50
Arsenic, white	Wood barrel		6.5		585		25
Do	do		7.2		575		28
Do	do		9.0		579		35
Asbestos (see also specific product):							
Crude	Bag		1.7		108		40
Do	do		2.3		102		52
Do	do		6.3		220		60
Fiber	Crate		7.6		218		80
Do	do		8.4		244		80
Do	Bale		8.3		57		327

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UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Asbestos (see also specific product)—Continued.							
Fiber	Cloth bag	None	5.2	1	126	125	93
Do	do	do	4.2	1	101	100	93
Do	Bag	do					90
Refuse	do	do					36
Asparagus, canned	Wood box	6 cans, No. 10	1.0	6	51	41	45
Do	do	24 square cans, No. 2	1.1	7	63	48	38
Do	do	24 square cans, No. 1	.6	5	36	26	39
Asphalt (see also specific product)	Bag		4.6		210		49
Do	do		4.7		200		53
Do	do		5.7		220		56
Do	Drum		9.0		428		47
Do	do		10.7		475		51
Do	Half drum		5.6		279		45
Do	do		6.7		289		52
Do	Wood box	6 cans, 1 gal. each	1.8	12	60	43	68
Do	do	12 cans, ½ gal. each	1.6	12	62	43	59
Do	do	24 cans, 1 pt. each	.9	8	35	21	59
Do	Drum	None	8.5		420		46
Emulsion	do		6.7		289		52
Do	do		6.7		281		53
Oil	do	None					58
Petroleum	Metal drum	do	8.3	20	368	348	51
Do	do	do	10.1	14	460	446	49
Do	do	do	10.1	24	465	441	49
Augers, earth	Wood box						107
Automobile:							
Axles	Bundle		13.3		145		204
Batteries. (See Batteries.)							
Chains (see also Tire)	Wood box						22
Fender, 112-in. (Ford)	6 sets each, crate		60.1		378		348
Parts (see also specific name)	Wood box		9.0		935		22
Do	do		24.0		1,237		43
Do	do		11.0		476		50
Do	do		4.0		251		33
Do	do		20.0		283		160
Chrysler	do		7.3		130		123
Do	do		15.3		310		110
Springs	do		4.4		374		26

Automobiles:							
Buick:							
Coupe	Unboxed		551.0		3,470		356
Sedan	Boxed		592.8		5,525		242
Do	do		578.0		5,025		258
Do	Unboxed		551.0		3,585		344
Chevrolet	Boxed		304.2		5,390		127
Sedan	Unboxed		507.5		2,935		390
Chrysler	Boxed		627.8		4,745		299
Do	do		578.0		4,310		304
Do	do		687.0		5,285		291
Do	do		617.7		4,570		308
Do	Unboxed		530.8		3,330		355
Ford	Boxed		467.7		4,250		246
Do	do		548.6		4,820		250
Do	do		620.0		5,660		248
Do	do		472.8		4,500		237
Town sedan	Unboxed		516.5		3,010		303
85	do		507.6		2,870		397
Hudson	Boxed		557.0		4,390		293
Do	do		531.0		4,095		295
Do	do		572.0		4,520		286
Do	do		484.0		4,385		249
Do	Unboxed		518.0		3,130		370
La Salle convertible sedan	Boxed		623.3		5,660		249
Lincoln Zephyr	do		620.0		5,680		248
Nash	do		628.0		5,400		262
Do	Unboxed		549.0		3,290		374
Oldsmobile coupe	do		532.0		2,915		409
Packard	Boxed		700.0		6,220		250
Do	do		578.9		5,080		256
Do	do		596.2		5,245		255
Pontiac sedan	do		519.1		4,384		266
Studebaker	do		463.4		3,835		273
Willys	Unboxed		462.8		2,253		460
Axes	Wood box						38
Babassu meal	Bag						85
Babbitt metal							19
Bacon	Bale	None	8.4		250		75
Do	do	do	6.0		243		60
Backs, dry-salt	Plywood box	Paper lining	14.0	46.5	¹638	513	49
Bellies, dry-salt	do	do	15.8	50	¹730	640	49
Cumberland, dry-salt	do	do	14.4	48	¹593	536	54
Slabs and sliced	Solid fiber carton	Glassine, parchment	2.8	8	108	100	58
Do	do	do	1.2	5	29	24	93
Wiltshire, sweet-pickled	Plywood box	Paper lining	15.7	55	615	560	57
Bagasse	Bale	None					50
Bagging, cotton (rolls)	Burlap wrapping		16.7	2	302	300	124
Do	do		22.8	2	402	400	127
Do	do		19.8	2	377	375	118

¹ Including salt.

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Bags:							
Burlap:							
New	Bale	None					52
Second-hand	do	do	26.3		661		89
Do	do	do	19.8		446		100
N. o. s.	do	do	18.0		300		130
Cotton	do	do					90
Paper	do	do	10.0		128		175
Do	Paper wrapping	do	2.7	2	64	62	95
Do	Bundle						90
Do	Bale	None	2.7		69		88
Moth							137
Second-hand	Bale	None					110
Shopping	Fiber carton						190
Baking powder	do	Tins	.5		19		59
Do	Wood box	do	.9		32		65
Balata	Bundle		5.0		206		54
Do	Bale		10.0		580		39
Do	do		2.6		140		41
Do	do		3.2		153		46
Do	do		16.0		564		62
Do	Wood box						62
Balsam wool	Roll						278
Barium:							
Carbonate, precipitated	Burlap bag	None	2.8	1	201	200	31
Chloride	Wood barrel	do	10.0	30	530	500	42
Do	Waterproof bags	do	1.2	1	101	100	27
Dioxide	Steel drum	do	7.2	70	570	500	28
Barley	Bag	do					60/62
Do	Bulk						54/58
Feed	Bag	None	6.4		200		70
Malt	Cloth bag	do	6.4	2	172	170	86
Do	do	do	4.0	2	112	110	80
Pearl	Wood box	Packages	.7		25		63
Do	do	24 tin cans	1.4	21	69	48	51
Do	Bag	None	2.4		100		54
Barrel:							
Heads	Wood barrel	do	12.0		229		118
Shooks	Bundle						91
Staves (see also Staves)	do	None	1.3		38		77
Barytes	Bag	do	1.0		102		22
Do	Wood barrel	do					26
Ground	Bag	do	1.0		101		22

Baskets:							
Canvas, empty							137
Waste-paper							491/678
Bathing:							
Caps	Carton		6.0		41		327
Do	do		1.3		12		233
Suits	Wood box		12.7		122		232
Bathtubs	Wood crate						134
Enameled	do	Packing material	36.5	164	535	370	149
Recess-type (1)	do	None	36.2	230	575	345	141
Do	do	do	32.8	180	525	345	140
5-ft	do	do	31.2	185	520	335	134
Rolled-rim (6)	do	do	62.2	450	1,950	1,500	72
Batteries	Carton		1.0		74		37
Acid wet	Wood box		3.1		159		43
Air cell	Corrugated fiber carton	Packing material	2.9	20	103	83	63
Assorted	Wood box		3.3		106		70
Automobile	do		2.9		170		38
Do	do		2.7		151		39
Do	do		5.8		260		50
Dry	do		2.1		80		58
Do	do		2.4		90		60
Do	Carton		.2		7		53
Storage, no acid	Wood box	4 units, separators	3.5	29	176	134	45
"B"	do	Packing material	4.2	34	209	175	45
Dry	Carton		7.0		44		33
Do	Crate		3.0		200		34
Do	Carton		1.0		66		40
Do	do		1.0		59		44
Do	Wood box		4.0		192		43
Do	Carton		1.0		66		40
Do	do		2.0		102		35
Do	Wood box		5.0		217		50
Dry cell	do	Packing material	5.1	40	304	264	37
Electric, dry	Carton		.8		47		40
Do	do		1.5		80		42
Do	do		1.4		73		43
Do	do		1.3		64		44
Do	do		.7		32		47
Do	Wood box		5.1		279		41
Do	do		3.2		166		42
Do	do		3.7		192		43
Flashlight	do	Packing material	3.6	39	180	141	45
Do	Carton		1.0		50		48
Do	do		1.0		45		40
Do	Wood box		4.0		192		43
Do	Carton		2.0		106		40
Do	Wood box		1.0		55		37
Do	Carton		1.0		66		42
Do	do		1.0		50		48
Do	do		1.0		60		38

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Taro weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Batteries—Continued.							
Flashlight—Continued.							
Do	Barrel		4.0		80		112
Do	Wood box		8.0		205		87
Primary	do		8.7		195		100
Battery:							
Boxes, empty	do						84
Carbons	do		3.3		224		33
Do	do		3.9		202		33
Chargers	do		1.7		26		151
Do	do		8.3		216		86
Clips	do		7.7		193		90
Parts. (See specific name.)							
Separators, wooden	do		6.2		238		58
Shells, zinc	Case		13.6		254		120
Do	do		14.7		272		122
Do	do		13.3		240		124
Empty	Fiber carton						86
Units, zinc oxide	Wood box						67
Beads, imitation pearl	do		4.0		150		60
Beans (see also specific name):							
Baked, canned	Carton		.7		32		47
Do	do		.7		31		47
Do	do		1.1		52		45
Do	do		1.1		59		45
Do	do		1.3		60		47
Do	Wood box		1.4		59		54
Do	do	6 cans, No. 10	1.2	9	53	40	50
Do	do	24 cans, No. 3	1.6	11	60	52	50
Do	do	24 cans, No. 2	1.0	8	43	30	52
Do	do		1.6		63		56
Cull	Bag						50
Dried	do	None	2.2		102		48
Do	do		2.7		102		59
Green and wax, canned	Wood box	6 cans, No. 10	1.2	9	51	38	52
Do	do	24 cans, No. 3	1.6	11	65	48	53
Do	do	24 cans, No. 2	1.0	8	41	28	53
Kidney and lima, canned	do	6 cans, No. 10	1.2	9	54	41	50
Do	do	24 cans, No. 2	1.0	8	42	29	54
Do	do	24 cans, No. 3	1.6	11	70	53	52
Lima, dried	Bag		2.7		98		61
Do	do		3.3		94		79

Navy	do		2.3		101		52
Pea	do	None	3.0		112		57
Tonka	Wood box						91
Bearings:							
Ball	do		1.0		157		17
Do	Fiber carton		.1		5		37
Roller	Wood box		3.0		525		12
Do	do		.9		152		30
Do	do	Paper cans and wax paper	4.9	33	300	267	37
Steel	do		2.7		234		26
Do	do		3.3		221		36
Tapered	do		2.4		241		22
Do	do		2.0		241		19
N. o. s.	do		1.0		173		15
Bedsprings	Crate		20.8		759		61
Do	do		18.5		655		63
Do	Bundle		20.3		346		132
Do	Wood box		13.1		585		50
Do	do		13.3		583		51
Do	do		14.7		648		51
Do	do		14.3		508		53
Bedsteads, springs, mattresses	do						230
Bee-comb foundation	do						100
Do	do		2.1		40		120
Beef:							
Canned	5 corrugated fiber cartons, strapped	120 round cans, 2 oz. each	1.0	12.5	27.5	15	81
Do	do	120 glass jars, 2 oz. each	2.1	40	45	15	105
Do	do	120 glass jars, 2½ oz. each	2.4	36	55	19	97
Do	do	60 glass jars, 5 oz. each	1.7	26	45	19	85
Do	do	60 glass jars, 3½ oz. each	1.3	19.5	32.5	13	90
Dried	Wood box		2.5		90		62
Frozen	Wire-bound box	None	1.2	4	59	55	46
Do	do	do	.6	3.5	58.5	55	23
Beef extract	Wood box						57
Do	do		2.1		120		39
Beefsteak and onions, canned	do		.7		28		53
Beehive supplies, n. o. s.	Wood crate						90
Beer	Steel barrel, 31-gal	None	8.7	90	353	263	55
Do	Steel half barrel	do	3.8	52	182	130	47
Do	Steel barrel, one-fourth	do	1.9	28	92	64	45
Do	Steel barrel, one-eighth	do	1.2	17	50	33	52
Do	Fiber carton	24 bottles, 12 oz. each	.9	1	36	18	56
Do	do	24 cans, 12 oz. each	.6	1	25	18	51
Do	Wood barrel	None	8.1		228		80
Do	Wood box	Bottles	3.3		106		70
Barrels, empty	Loose		5.0		70		160
Beeswax	Wood box		1.5		62		54
Do	do		4.0		149		58
Do	Wood barrel	None					71
Bleached	Wood box	8 units, 25 cakes each	4.8	25	225	200	48
Beet pulp	Bag	None	5.5		100		124
Beet seed. (See Seed.)							

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Beets, canned	Wood box	6 cans, No. 10	1.2	9	52	39	52
Do	do	24 cans, No. 3	1.6	11	67	50	53
Do	do	24 cans, No. 2	1.0	8	43	30	52
Do	do		1.3		52		57
Bellies (see also specific name)	do		14.0		657		47
Belt fasteners	do		2.8		163		39
Do	do		2.5		158		40
Do	do		2.8		152		42
Do	do		3.7		164		51
Metal	do		2.7		234		26
Do	do		.3		15		49
Do	do		2.8		154		41
Do	do		2.9		151		43
Belting:							
Conveyor, 28-oz., 24-in., 5-ply, 500 ft	do		58.1	235	2,635	2,400	50
Cotton	Bale						58
Leather	Wood box						61
Transmission, 35-oz., 18-in., 10-ply, 500 ft	do	None	66.8	275	2,525	2,250	59
Transmission, 28-oz., 4-in., 4-ply, 500 ft	do	do	4.8	20	180	160	59
N. o. s.	Reel		43.0		1,943		50
Belting butts, leather	Burlap bale	Paper lining	4.1	3	178	175	52
Belts, fan. (See Fan belts.)							
Benzol (see also specific name)	Drum	None					59
Do	Steel drum, ICC-5E, 55-gal	do	11.6	53	443	390	59
Berets, wool, knit	Fiber carton	do	1.5	2	15	13	224
Bicycles:							
Adult model (2)	Wood crate	Paper bag	15.1	33	107	74	315
Juvenile model (2)	do	do	11.1	28	88	60	283
Tank model (2)	do	do	16.1	33	116	83	311
Billets. (See specific name.)							
Biscuits	Carton		2.3		23		219
Cream crackers	Fiber carton	24 pkgs., 5 oz. each	.9	2	15	8	149
Dog	Bag	None					177
Bismuth:							
Metal	Wood box						10
Do	do		1.0		279		8
Do	do		1.1		268		10
Do	do		1.5		291		12
Do	do		2.0		313		14
Ingots	do	None	.4	11	163	152	5
Subcarbonate	Wood barrel	do	6.4	25	225	200	64
Blackberries, canned	Wood box	6 cans, No. 10	1.2	9	53	40	51
Do	do	24 cans, No. 3	1.6	11	68	51	51
Do	do	24 cans, No. 2	1.0	8	43	30	52

Do	do	6 cans, No. 10	1.2	9	51	38	52
Do	do	24 cans, No. 3	1.6	11	66	49	52
Do	do	24 cans, No. 2	1.0	8	41	28	55
Blackboards	Wood crate	None	4.7		144		74
Blacking	Wood box	Packages	.7		24		66
Do	Wood barrel	None					46
Black plate	Wood box		1.0		122.0		185
Blackstrap. (See Molasses.)							
Bladders, dry	Wood barrel	None					288
Blanc fixe	Paper bag	do	1.2	.5	50.5	50	53
Do	Wood barrel	do	10.0	30.0	380.0	350	59
Blanket cloth, cotton, unfinished	Roll	do					582
Blankets:							
Cotton	Wood box						290
N. o. s.	do		5.0		57		196
Blasting caps	do	None	1.1	14	39	25	62
Do	do		2.0		82		55
Blasting powder	Steel keg	None	.5	2	27	25	42
Bleaching powder (see also Chlorinated lime)	Fiber carton		1.7		50		78
Do	Drum	None	12.0		470		58
Blocks (see also specific name):							
Asbestos	Wood box		15.7		356		98
Do	do		15.7		313		112
Magnesia							70
Building, glass	Carton						47
Butchers'	Crate						50
Last	Wood barrel						148
Do	Loose						85
Mangle roller							44
Paving, creosoted	Bag						140
Segment							30
Blood, dried	Bag						90
Blue, laundry	Wood barrel	None					58
Bluestone (blue vitriol)	Wood box		2.3		131		39
Do	Wood barrel	None	12.7		688		45
Board, fiber (not vulcanized fiber)	Wood box						57
Boards:							
Insulating (see also Insulation)	Bundle						39
Ironing, in the white	Wood box						192
Boiler:							
Compound	Drum	None	10.7		507		47
Do	Wood barrel	do					56
Liquid	Drum	do	12.0		588		45
Preservative	do	do	4.7		246		42
Boiler flues	Loose		4.4		289		35
Boiler ranges	do		15.5		205		170
Boilers:							
Heating, household, cast-iron	Wood crate	None	19.8	69	710	641	62
Range:							
18-gal	Loose		3.0		48		140
30-gal	do		5.0		69		160
40-gal	do		7.0		83		186

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Bolts:							
Iron	Wood box		2.6		285		20
Do	do		1.7		216		18
Steel	do		4.5		715		14
Bolts and nuts:							
Brass	do						30
Iron and steel	Keg		1.7		222		17
Do	do		1.7		234		17
Do	do		1.6		208		17
Do	do		1.5		208		16
Do	do		1.7		208		19
Do	do		2.1		196		24
Do	Wood box		2.1		273		17
Do	do		3.1		344		20
Do	do		3.1		321		22
Do	Case						17
Bone:							
Ash	Wood barrel	None					46
Black	do		8.7		336		58
Do	do		6.7		177		84
Do	Bag	None	2.5		116		48
Do	Wood barrel	Paper liner	8.9	26	276	250	72
Char	do	do	7.6	26	301	275	57
Do	do	do	7.6	26	246	220	70
Dry	Bag	None					84
Meal	Wood barrel		12.9		576		50
Do	Bag						47
Scrap. (See Scrap.)							
Book cloth	Wood box		11.7		400		68
Bookkeeping machines. (See Accounting machines.)							
Books	do		10.0		266		80
Do	do		9.4		292		72
Do	do		5.3		211		56
School	do	25 units of 10 each	4.2	42	184	141	51
Borate ore, crude	Bag		1.6		100		35
Borax	do		2.0		111		40
Do	do		2.3		124		42
Do	Wood cask	None	6.1		200		68
Do	do	do	8.1		240		77
Refined	Wood barrel	Paper liner	9.6	20	355	335	60
Do	Cloth bag	None	2.3	2	100	98	53
Do	Fiber carton	12 pkgs., 8 oz. each	.4	1	9	6	102
Do	do	12 pkgs., 16 oz. each	.7	1	16	12	97

Bottle:							
Cappers:							
Automatic, rotary	Wood box	None	126.4	970	3,350	2,380	85
Automatic, straight-line	do	do	145.0	550	1,540	990	211
Hand-feed	do	do	101.2	450	1,150	700	197
Caps (see also Bottle and jar)	do	do	7.2	36	236	200	68
Do	do	do	3.7	20	120	100	70
Do	do	do	1.9	12	62	50	70
Do	do	do	1.7	5	55	50	70
Do	do	do	7.4		222		75
Do	do		6.3		112		127
Do	Carton		6.3		109		130
Do	do		6.3		80		177
Do	do		6.3		63		225
Do	Wood box		2.3		68		79
Do	do		10.0		282		80
Do	Fiber carton		4.0		121		82
Caps or disks, paper							200
Fillers:							
Rotary vacuum	Wood box	None	186.7	980	3,315	2,335	126
Straight-line vacuum	do	do	143.0	600	2,100	1,500	154
Syphon	do	do	39.9	220	440	220	203
N. o. s.	do	do	187.8		3,700		114
Stoppers	Wood barrel		9.6		200		107
Cork	Wood box		1.8		25		164
Do	do		5.6		76		172
Porcelain	do						108
Rubber	do		7.2		206		78
Washers:							
Fully automatic	2 wood boxes	None	669.3	2,900	9,800	6,900	153
Rotary	Wood box	do	140.1	550	1,350	800	232
Straight-line	do	do	157.9	575	1,300	725	272
Bottle and jar caps (see also Bottle)	Fiber carton						120
Aluminum	Wood box						68
Bottles, empty:							
Glass	do		1.3		40		73
Do	Wood crate		6.3		150		95
Do	Wood box		3.2		70		103
Milk	do						66
Bottles, wrappers for	Bale	None	6.4		90		160
Bowl, closet, and tank (see also plumbing fixtures)	Wood crate	Packing material	9.2	49	152	103	140
Boxboard:							
Folding	Bundle		3.2		118		60
Do	do		3.7		113		73
N. o. s.	do		1.5		66		51
Box shooks	do		1.1		30		78
Do	do		1.0		23		97
Do	Wood box		1.7		31		120
Box strapping	Case		1.3		142		21

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Boxes, knocked-down:							
Hat, cardboard	Wood box						202
Paper	do		11.4		316		81
Do	Bundle		7.3		164		100
Corrugated	do		3.1		75		92
Brackets, iron or steel	Wood box						80
Braid, cotton	do						154
Brake:							
Compound for brake lining	do						160
Fluid	do		1.7		72		52
Do	do		1.5		66		51
Do	Drum		1.2		47		56
Lining	Wood box		6.3		380		36
Asbestos	do	None	6.9	40	370	330	42
Do	do	do	4.7	30	210	180	50
Do	Plywood drum	do	3.6	12	121	109	67
Do	do	do	5.4	15	223	208	54
Do	Wood box		3.5		105		75
Automobile	Bale	None	2.0	3	124	121	36
Molded	Wood box		4.6		118		86
Do	do		2.5		102		55
Brake-lining machine	do		13.6		280		109
Bran	Bag	None	3.5		55		145
N. o. s.	do	do					175
Brass:							
Plate	Bundle		34.3		7,674		10
Rods (see also Copper)	Wood box		1.3		287		10
Do	Bundle		.7		122		14
Do	do		5.6		508		25
Do	do		1.1		90		27
Do	Wood box	None	3.1	48	523	475	13
Scrap. (See Scrap.)							
Sheets (see also Copper)	do						24
Coils	do	None	2.9	33	416	383	15
Strips	do	do	2.9	46	537	491	12
Strips	do		2.3		507		10
Do	do		2.5		580		10
Do	do		2.6		548		11
Do	do		6.4		548		26
Do	do		7.2		539		30
Bread-slicing machinery. (See Slicing machinery.)							
Bread-wrapping machine:							
16-in. long bed sealer	do	None	3.0		40		168
17-in. semiautomatic wrap sealer	do	do	22.0		250		197
18-in. sealer	do	do	8.0		115		156

Brick:							
Fire; and firebrick shapes, packed	Wood barrel						30
Do	Crate						17
Plastic and mortar, unshaped	Drum						22
Refractory:							
Chrome	Wood crate	None	2.6	22	352	330	16
Do	Fiber carton	do	.7	2	112	110	13
Do	Corrugated fiber carton	do	.7	3	116	113	13
Do	Wood crate	do	3.8	43	359	316	24
Do	Wood skid	do	34.4	250	3,979	3,729	19
Fire-clay	Wood crate	do	4.9	38	470	432	23
Do	do	Packing material	5.0	30	438	406	25
Do	Fiber carton	None	.7	2	82	80	18
Do	Corrugated fiber carton	do	.7	3	73	70	22
Do	Wood crate	do	4.9	34	286	252	38
Do	Wood skid	do	52.4	589	4,754	4,165	24
Magnesite	Wood crate	do	2.6	22	322	300	18
Do	Fiber carton	do	.7	2	98	96	15
Do	Corrugated fiber carton	do	.7	3	103	100	15
Do	Wood crate	do	3.8	38	318	280	27
Do	Wood skid	do	37.5	255	3,915	3,660	22
Silica	Wood crate	do	4.9	38	362	324	30
Do	Fiber carton	do	.7	2	62	60	24
Do	Corrugated fiber carton	do	.7	3	62	59	25
Do	Wood crate	do	6.1	54	373	319	37
Do	Wood skid	do	50.0	599	3,903	3,304	29
Bristles	Wood box		3.3		131		56
Do	do		4.5		165		61
Do	do		3.1		95		73
Do	do		9.6		287		75
Do	do		6.3		179		80
Do	Cask		21.4		558		86
Do	Wood box		4.0		146		65
Do	do		3.0		133		58
Do	do		5.0		172		60
Bromine	do		4.0		150		60
Bronze rods and sheets (see also Copper)	do	9 bottles, 6½ lb. each	3.7	19	140	59	59
Bronze powder	do		.8		123		15
Do	Drum	None	1.0		106		28
Brooders, chicken	Wood box						50
Broomroot	Wood crate		59.0		1,500		88
Brooms	Bale	None	8.3		129		144
5 doz	Bundle	do	12.7		120		237
Brooms and whisks	Bale	do	14.0		115		273
Brushes:	Bundle	do					304
Dust	Carton		2.2		12		403
Personal	do		.7		9		166
Skunk	Bale	None	35.0		517		150
Wire. (See Wire brushes.)							
Wood	Wood box		5.0		60		187
Brushes and electrodes, carbon (see also Electrodes)	do	6 fiber cartons	9.7	76	283	200	77
Do	do	2 fiber cartons	4.0	42	117	73	77

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Buckets:							
Dredger	Loose						59
Galvanized iron	Wood crate	None	1.6		188		20
Buckwheat (see also Flour)	Bag	do					66
Buffing, polishing compound	Wood barrel	do					43
Building blocks. (See Blocks.)							
Bulbs, electric:							
Ready for use	Carton		1.7		19		197
Do	do		1.7		19		200
Do	do		5.5		42		295
Without metal attachments	Hamper		6.3		40		358
Do	Carton		2.7		35		176
Do	do		4.2		40		233
Do	do		6.3		58		244
Do	do		4.3		39		249
Do	do		7.3		53		372
Bulbs, lily	Wood box						42
Bungs:							
Hog	Wood tierce		14.0		731		42
Wooden	Bag	None					123
Do	Wood barrel	do					147
Do	Bundle	do	12.0		293		92
Burlap (see also Bags)	Bale	do					60
Business machines. (See specific name.)							
Butter	Wood box	do	1.3		63		47
Do	Tub	do	2.3		72		70
Do	Cask	do	3.3		122		60
Do	Wood box	48 cans, 1 lb. each	1.7	23	69	46	55
Do	do	24 cans, 2 lb. each	1.5	20	66	46	51
Do	do	16 cans, 5 lb. each	2.6	28	105	77	55
Do	Firkin	None					60
Buttermilk:							
Flaked or powdered	Bag	do					90
Semisolid	Wood barrel	do					50
Buttons	Wood box						49
Cabinets, kitchen	do	None					234
Cable, electric, new	Reel	do					36
Cable reels:							
Knocked-down	Loose		12.3		310		90
Set-up	do		158.0		2,000		175
Cadmium copper conductor	Reel		40.4		5,686		16
Do	do		40.4		5,746		16
Caffeine	Wood box, paper liner	10 pkgs., 11 lb. each	5.5	32	147	110	83
Caffeine alkaloid	Drum		4.8		109		101

Calcium:							
Arsenate	Steel drum	None	5.1	12	112	100	102
Do	Fiber carton	12 bags, 4 lb. each	1.4	3	52	48	62
Do	do	48 bags, 1 lb. each	1.5	3	52	48	64
Do	do	24 fiber cans, 1 lb. each	1.4	3	33	24	97
Carbide	Drum	None	2.5		107		53
Do	do	do	2.1		117		40
Do	do	do	1.9	6.5	107	100	40
Carbonate	Bag	do	1.9		102		42
Chloride	Drum	do	9.0		650		31
Flaked	Fiber drum	do	8.4	22	422	400	45
Do	Cloth bag, paper liner	do	4.1	1	101	100	90
Granular	Steel drum	do	8.4	20	420	400	45
Solid	do	do	8.4	20	720	700	26
Gluconate	Wood barrel	do	9.0		151		132
Do	Drum	do					114
Hyposulfite	Wood box		2.5		64		88
Phosphate. (See Phosphate.)							
Silicon	Drum	None	5.7		366		35
Calculating machines. (See Accounting machines.)							
Calf meal (see also Feed, mixed; and other specific names)	Bag						47
Cameras	Wood box		15.0		330		102
Do	do		8.9		155		129
Do	do		7.3		190		85
Motion picture, amateur	do	112 cartons	10.1	51	360	260	62
Photographic	Fiber carton	295 cartons	9.6	30	380	290	56
Camphor oil	Drum	None	32.0		1.440		56
Camphor, synthetic	Wood barrel	Paper liner	7.2	24	174	150	93
Candles	Wood box		1.2		40		68
Butts	do		10.0		228		98
Paraffin	Fiber carton		2.0		69		55
Do	do		1.0		37		77
Candlesticks, brass or copper	Wood box	Cartons	1.7	12	120	102	31
Candy (see also specific name):							
Caramel	do	24 separators, 5½ lb. each	2.8	13	152	132	42
Do	do	96 pkgs., ½ lb. each	1.3	10	64	48	45
Chocolate:							
Nut bars	Fiber carton	1 unit of 24 cartons	2.3	5	68	50	77
Do	Wood box	12 units, 24 bars each	.8	1	32	27	59
Packaged	do	Cardboard boxes, fancy	4.0	50	120	60	75
Do	Fiber carton	do	2.0	5	38	24	118
Do	Wood box	12 cardboard boxes, fancy, 5 lb. each	3.0	45	120	60	56
Do	Fiber carton	do	2.0	5	75	60	59
Hard	Wood box		2.1		89		52
Do	Wood barrel	Jars	10.0	30	180	75	124
Do	Wood box	Can	3.0	45	120	60	56
Do	Wood barrel	Jars	10.0	30	120	55	187
N.o.s.	Wood box						60
N.o.s.	Pail						90

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Canners' machinery:							
Can body former	Wood box	None	100.0	550	2,200	1,650	102
Hand-operated	do	do	30.0	150	400	250	172
Can body maker:							
Automatic:							
No soldering attachment	do	do	400.0	1,100	8,800	7,700	102
Do	do	do	225.0	800	5,000	4,200	102
Soldering attachment	do	do	390.0	1,600	8,600	7,000	102
Lock seamer, soldering attachment	do	do	308.9	1,785	10,785	9,000	64
Can-closing machine:							
Automatic:							
For round cans	Wood crate	do	125.0	500	3,500	3,000	80
Vacuum closing	Wood box	do	180.7	725	6,365	5,640	64
Do	do	do	139.2	525	4,580	4,055	68
Hand-operated, for round cans	do	do	40.0	250	750	500	118
Do	do	do	6.0	13	65	52	204
Semiautomatic	do	do	90.0	335	1,325	990	149
Can seamers, automatic:							
30 cans per minute	do	do	187.5	350	7,760	7,410	55
100 cans per minute	do	do	167.0	630	4,430	3,800	83
Canoes, rigid, burlapped	Wood crate						2,400
Cans:							
Galvanized iron	Crate		14.0		135		232
Ice cream, 3-gal., empty							204
Caps:							
Bathing. (See Bathing caps.)							
Miners' pit	Fiber carton						304
Carbitol	Drum		11.2		512		49
Carbon:							
Arc lamp	Wood box		5.7		258		50
Bisulfide	Steel drum, ICC-5, 55-gal	None	13.0	110	660	550	445
Do	do	do	12.0	100	600	500	4
Do	do	do	1.0	12	62	50	37
Black	Wood box	Paper liner	13.9	58	370	312	83
Do	do	do	14.0	55	280	225	112
Do	Paper bag	None	2.2	1	51	50	93
Do	Bag		2.7		52		115
Do	Wood box		14.5		285		114
Do	do		14.1		238		132
Brushes and electrodes. (See Brushes and electrodes, carbon.)							
Paper. (See Paper.)							
Retort	Bag						70

Tetrachloride	Drum	None	11.7		754		35
Do	do	do	11.7		720		36
Do	Wood barrel	do					36
Do	Wood box	Cans	1.0		43		52
Do	Crate	do	7.5		480		35
Carbonic acid gas	Drum	None	3.0		156		43
Carbons:							
Activated	Cloth bag	Paper liner	7.0	3	78	75	204
Do	Fiber carton	2 paper bags, 35 lb. each	5.0	7	79	70	140
Do	Cloth bag	Paper liner	4.3	3	53	50	187
Do	Paper bag	None	.5	1	36	35	29
Arc. enclosed, ½″ x 9″	Wood box	48 fiber cartons, 50 pieces each	3.4	34	273	222	28
Motion picture studio, cored, 8 mm. x 12″	do	100 fiber cartons, 50 pieces each	6.7	30	343	284	44
Photographic, cored, ½″ x 12″	do	40 fiber cartons, 50 pieces each	6.7	37	310	258	49
Projector	Case		3.6		144		56
Cored:							
½″ x 6″	Wood box	60 fiber cartons, 50 pieces each	3.4	34	219	167	34
6 mm. x 12″	do	100 fiber cartons, 50 pieces each	4.9	29	195	141	56
8 mm. x 8″	do	120 fiber cartons, 50 pieces each	3.4	32	253	201	30
8 mm. x 12″	do	100 fiber cartons, 50 pieces each	6.7	36	368	309	41
Do	do	do	6.7	35	304	245	50
9 mm. x 12″	do	50 fiber cartons, 50 pieces each	4.9	30	248	201	45
10 mm. x 8″	do	80 fiber cartons, 50 pieces each	3.4	32	238	187	32
10 mm. x 12″	do	40 fiber cartons, 50 pieces each	4.9	30	199	156	56
12 mm. x 8″, copper-coated	do	60 fiber cartons, 50 pieces each	3.4	34	243	193	31
Solid:							
1½″ x 12″	do	40 fiber cartons, 50 pieces each	6.7	36	284	232	53
7 mm. x 8″	do	160 fiber cartons, 50 pieces each	3.4	35	265	208	28
9 mm. x 8″	do	90 fiber cartons, 50 pieces each	3.4	32	245	192	31
9 mm. x 12″	do	40 fiber cartons, 50 pieces each	4.9	30	186	139	59
Carborundum, ground	Bag	None					37
Carpet scraps	Bale	do	14.5		235		138
Carpet sweepers, nonelectric	Wood box						135
Carriers, egg, pulpboard	Fiber carton						336
Cartons, paper, empty	Wood box		15.0		166		202
Cartridges:							
Revolver, 38-caliber	do	40 boxes, 50 cartridges each	1.6	5	76	67	17
Revolver, 45-caliber	do	do	.7	7	101	90	16
Rifle, 22-caliber	do	20 units, 10 boxes each	.7	5	85	76	19
Safety	do	Boxes					37
N. o. s.	do		.9		63		32
Car-washing machine	do		33.1		908		82
Cascara	Bag	None	5.3		74		160
Casein	Wood barrel	do					65
Cash-register tape	Wood box	do	8.3	42	240	198	77
Cash registers	do	do	5.0	36	156	120	72
Do	do	Waterproof paper	8.2	39	140	70	132
Do	do		5.0		200		56
Cash tills	do						132
Casings	Tierce		13.0		707		42
Hog	do		12.0		751		35

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Casings—Continued.							
Hog—Continued	Tierce		12.0		677		40
Do	do		12.0		670		40
Do	do		14.0		738		40
Do	do		12.0		642		43
Do	do		14.0		735		42
Do	do		13.0		689		42
Sausage	do		13.0		704		42
Do	do		12.0		600		45
Do	do		14.0		734		42
Do	do		13.0		689		40
N. o. s.	Wood barrel		12.7		700		41
Do	do		11.9		620		43
Do	do		17.0		800		46
Do	Tierce		11.5		712		36
Do	do		13.7		750		39
Do	do		12.7		714		40
Do	do		12.7		627		45
Do	do		15.9		782		46
Do	do		16.0		750		48
Casks, palm, empty							202
Casks, n. o. s							413
Cassava flour	Bag	None					60
Caster assemblies	Barrel		7.0		386		40
Casters and caster assemblies	Wood box						71
Do	Wood barrel						31
Castings:							
Steel	Box		14.0		1,054		30
Do	Wood box		14.0		436		72
Stove, iron	do		1.0		90		25
N. o. s.	Wood crate		6.8		360		43
N. o. s.	Loose		.4		50		18
Castings or forgings, rough							16
Castor oil	Barrel		10.7		500		49
Do	Drum	None	11.7		493		53
Sulfonated	Barrel		11.9		515		52
Do	Drum	None					58
Catalyst dehydragenation	do		11.7		517		51
Catalyst phosphoric	do		10.2		404		50
Catchup, tomato	Wood box	24 bottles and packing material	1.1	8	50	21	50
Do	Fiber carton	do	1.2	3	44	20	60
Do	Wood box	do	.8	4	33	12	55
Do	Fiber carton	do	.7	2	29	12	51
Do	Wood box		1.0		32		70
Do	do		1.6		50		71

Caulking cotton	Bale	None					224
Cedarwood oil	Wood barrel	do					58
Do	Drum	do	11.0		470		50
Do	do		11.7		406		56
Light	Metal drum	None	12.7	55	490	435	58
Cellophane	Wood box		5.7		212		60
Cellosolve	Drum	None	12.0		462		57
Do	do	do					55
Do	do		10.9		461		53
Do	do		11.2		461		54
Do	do		12.0		500		54
Celluloid. (See Pyroxylin.)							
Cellulose acetate:							
Film	Case		4.3		201		48
Do	do		4.3		202		48
Do	do		5.7		223		56
Plastic	Drum	None	6.0		227		55
Do	Fiber drum	do	8.3	22	147	125	126
Do	Corrugated fiber carton	do	5.4	10	110	100	108
Sheets	Carton		5.3		105		114
Do	Wood box		4.2		212		44
Do	do		6.4		223		65
Do	do		2.0		2.8		160
Do	Drum		11.2		278		90
Do	do		10.6		285		83
Do	Case		13.6		494		62
Cellulose wadding	Wood box						639
Do	Carton	None	15.8		80		445
Do	do		34.5		120		646
Cement	Wood barrel	None	6.3		400		35
Do	Bag	do	1.1		95		27
Abrasive polishing	Drum						35
Alundum	Keg						50
Asbestos	Bag	None	3.3		105		70
Packed	do						88
Rock (slag wool cement)	Paper bag	None	2.8	1	51	50	125
Building	Bag		1.1		95		26
Do	Wood barrel		5.8		296		33
Do	Bag						33
Do	Wood barrel						36
Copper	Bag	None	1.3		105		28
Dry	Box		6.0		204		50
Iron	Keg		1.0		83		25
Do	Wood box		.4		34		27
Do	do		.6		35		37
Magnesia	Bag						144
Refractory	do		2.0		101		37
High-temperature	Steel drum	None	4.6	22	272	250	38
Roofing	Drum	do	3.0		155		44
Do	do		4.3		213		45
Do	do		3.0		150		45
Roofing or roofing primer	do						45

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Cement—Continued.							
Rubber	Fiber carton	1-gal. can	.2	1	7	6	68
Do	Drum	None					85
Do	Can	do	1.8		54		75
Do	Steel drum, 5-gal	do	1.0	6	36	30	62
Do	Wood box	1-gal. can	.3	3	10	7	68
Waterproofing	Bag						24
Cement cloth	Bale	None	26.0		1,430		41
Cement solution	Drum		11.0		600		40
Centrifuges:							
Portable	Wood box	None	123.0	450	2,200	1,750	124
Do	do	do	138.0	600	2,150	1,550	140
Stationary	do	do	41.0	250	1,100	850	83
Do	do	do	28.0	250	800	550	77
Cereals (see also specific name):							
Flakes	Fiber carton	24 pkgs. 7 oz. each	1.4	1	15	11	224
Do	do	36 pkgs., 8 oz. each	3.8	3	27	18	320
Granular	Wood box	24 pkgs., 12 oz. each	.9	5	25	18	80
Do	do	24 cans, 13 oz. each	1.3	7	35	20	86
N. o. s.	do		3.0		28		267
Do	Carton		2.0		18		225
Do	Package		1.0		39		67
Do	Wood box		3.0		28		245
Do	do		2.0		66		62
Do	do		3.7		60		140
Do	do		4.0		115		77
Chains:							
Cutter	Crate		5.0		340		32
Industrial	Cask		5.3		516		23
Iron	Barrel		12.0		1,054		24
Do	Wood barrel		11.3		1,205		19
Do	do		12.7		1,179		24
Steel	Wood box		1.9		218		21
Timing, gas-engine	do	94 cartons	4.3	28	245	198	39
Tire. (See Tire.)							
Chains or cable, iron, or steel (not automobile or bicycle)	Drum						54
Chairs:							
Barber	Crate		18.9		436		97
Also poles	Case						156
Theater	Bundle						90
Wooden, folding	Crate						290
Charcoal	Bag						66
Check signers	Wood box		1.3		31		90
Check writers	do		5.0		101		113

Cheese, domestic:							
Cheddar	Plywood box	None	2.2	10	80	70	61
Do.	Wood box	6 cheeses, foil-wrapped	.6	5	35	30	39
Do.	do.	12 units of 6 pkgs., ¼ lb. each	.4	4	22	18	41
Do.	Fiber carton	12 jars	.3	2	9	5	75
Liederkranz	Bundle	12 boxes	1.0	6	46	40	49
Cheesecloth	do.		15.0		252		134
Cheese wrappers	Wood box		8.0		307		58
Cherries:							
Canned	do.	6 cans, No. 10	1.2	9	53	40	50
Do.	do.	24 cans, No. 3	1.6	11	68	51	52
Do.	do.	24 cans, No. 2	1.0	8	45	32	50
Do.	do.	Cans	1.6		53		67
Fresh	do.	None	.4	3	18	15	53
Chestnut extract:							
Liquid	Wood barrel	do.	12.3	75	575	500	48
Powdered	Cloth bag	Paper liner	2.9	1	101	100	64
Chests:							
Cedar, empty	Wood crate	None					358
Ice (not mechanical refrigerators)							144
Tool, empty	Wood crate						193
Chewing gum	Wood box		2.0		50		90
Do.	do.	100 boxes, 20 pkgs. each	2.9	13	115	85	56
Do.	Fiber carton	50 boxes, 20 pkgs. each	1.1	3	51	36	46
Do.	do.	12 jars	1.5	6	60	28	57
Do.	Case		2.7		108		55
Do.	do.		2.5		100		56
Do.	do.		3.4		130		59
Do.	do.		3.9		115		76
Do.	do.		2.8		80		79
Do.	Wood box		1.7		62		60
Do.	do.		1.8		69		59
Chicle	Bag						38
Mixture	Wood box		5.0		241		47
Chili sauce	Fiber carton	24 bottles, 12 oz. each	.8	3	39	19	49
Do.	Wood box	12 bottles, packing material	.8	4	30	12	60
Do.	do.	do.	.6	4	24	9	57
Do.	Fiber carton	12 bottles	.7	2	24	12	63
Do.	do.	do.	.5	1	20	9	58
Chimneys, kerosene lamp	Wood box	12 fiber cartons, 12 chimneys each.	12.6	26	105	55	280
Do.	Fiber carton	36 tubes, 1 chimney each	3.0	3	18	14	373
Do.	do.	12 tubes, 1 chimney each	1.0	2	6	4	373
Chinawood oil	Drum		10.7		473		51
Do.	do.	None					57
Chipboard	Roll		15.3		469		73
Do.	Bundle		5.7		230		56
Do.	do.		13.7		523		59
Do.	do.		14.7		505		65
Do.	do.		11.7		382		69
Do.	do.		14.3		469		73
Chlorasol	Steel drum, ICC-5E	None	11.7	53	643	500	41
Chlor-a-tet	Drum	do.					40

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Chloride, ethyl	Steel barrel, ICC-5A, 33-gal	None	7.0	67	267	200	59
Chlorinated lime (see also Bleaching powder)	Steel drum	do	19.5	38	863	825	51
Do	do	do	8.4	25	358	333	52
Do	do	do	2.6	9	109	100	53
Chlorinated rubber. (See Rubber, chlorinated.)							
Chlorine, liquid	Steel cylinders	do	42.5	1,350	3,350	2,000	28
Do	do	do	3.5	123	273	150	28
Do	do	do	2.7	93	193	100	31
Chloroform	Steel drum, 55-gal	do	13.0	100	750	650	39
Do	Steel drum, 10-gal	do	2.2	19	139	120	35
Do	Steel drum, 5-gal	do	1.0	12	72	60	32
Chocolate	Wood box	2 boxes, 6 lb. each	.4	3	16	12	59
Do	Fiber carton, paper liner	12 cakes, ½ lb. each	.2	1	7	6	51
Do	do	Cardboard boxes	1.3	8	33	25	88
Do	Wood box	4 cans, 64 pkgs. each	1.8	11	70	48	57
Do	do	4 cans, 192 pkgs. each	1.6	12	68	48	53
Do	do		4.0		182		49
Do	do		1.2		30		90
Coating:							
Plain	Wood box, paper-wrapped	None	2.3	15	115	100	45
Do	Wood box, tin-lined	do	2.3	23	123	100	41
Do	Fiber carton, paper-wrapped	do	1.0	2	52	50	41
Sweetened	Wood box	10 cakes, 10 lb. each	2.0	10	110	100	41
Do	Fiber carton	5 cakes, 10 lb. each	.9	2	52	50	39
Chrome ore. (See Ore.)							
Chrome sulfate	Wood barrel	None	11.3		517		49
Cider	do	do					56
Cigarettes (see also Tobacco)	Wood box, metal bands	5 units, 50 cartons each	13.9	75	265	125	118
Do	Fiber cartons	50 cartons, 10 pkgs. each	2.0	4	38	26	118
Do	Wood box		15.7		375		94
Do	do		6.8		152		99
Do	do		7.2		152		106
Do	do		5.3		110		109
Do	do		3.3		61		122
Do	do		2.4		48		113
Do	do		6.4		122		118
Do	do		1.9		34		126
Do	do		4.5		87		116
Do	do		2.4		48		113
Do	do		6.4		121		119
Do	do		2.7		86		72
Do	do		2.7		53		113
Do	do		1.6		50		71
Do	do		7.3		136		121
Do	Cartons		2.0		38		118

Do	Wood box		1.9		36		119
Do	do		2.0		36		124
Do	do		2.2		39		124
Do	do		2.2		36		135
Cigar molds	do		17.0		470		82
Cigars (see also Tobacco)	do		10.2		198		115
Do	do		7.5		156		108
5,000	do		10.5		173		136
10,000	do		18.0		325		124
Cinnamon	Bag	None					129
Ground	Fiber carton	8 units of 12 cans each	1.1	2	32	12	74
Citrate of lime. (See Lime.)							
Clam shells	Bag	None					56
Clarex	do	do	6.0		103		140
Clay:							
Common	do	do	.8		51		32
Do	do	do	3.5		192		41
Do	do	do	1.6		51		70
Do	Barrel		6.5		383		38
Do	do		8.4		330		57
Do	Drum		2.9		221		29
Do	Plywood drum		7.3		276		59
Fire	Bag		1.3		100		28
Do	Keg		4.8		336		28
Do	do		5.1		364		31
Do	do		6.2		326		42
Do	Wood barrel		10.7		587		41
Do	Burlap bag	Paper lining	1.6	4	104	100	34
Clay pigeons	Wood barrel		6.8		130		125
Do	do		9.0		135		149
Cleaners, vacuum. (See Vacuum.)							
Cleaning compound	do	None	12.0		522		50
Do	do	do	4.0		212		42
Do	Drum	do	12.0		470		57
Cleansing tissues. (See Paper.)							
Clippers:							
Bolt	Wood box		.8		105		16
Hair	do		4.7		104		100
Do	do		1.8		40		98
Horse	do		2.0		37		121
Clips:							
Paper	do		2.6		55		105
Do	do		6.3		155		91
Pencil	do		9.1		244		83
Steel	do		5.9		180		74
Clock movements	do		5.6		72		174
Do	do		4.7		80		133
Clocks:							
Alarm	do	48 cartons	5.0	22	132	90	86
Do	do	do	3.8	20	110	76	77
Do	do	do	1.3	9	54	38	56
N. o. s.	do		3.7		66		124
N. o. s.	do		3.7		70		120

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Cloth. (See Textiles; and specific name.)							
Clothes:							
Bars, wood	Wood crate		12.1		71		351
Closets, cardboard, knocked-down	Fiber carton						502
Do	Wood box						296
Pins	do						94
Wringers	do		2.8		164		39
Do	do		3.3		182		41
Do	do		3.5		120		65
Washing, hand	do						98
Clothing (see also specific name):							
Rubber (see also Rubber)	do		11.0		148		166
Second-hand	Bales		25.0		526		106
Do	do		18.3		384		106
Do	do		17.8		428		93
Do	do		20.0		465		96
Do	Crates		6.1		78		174
Do	Bale		15.7		303		117
N. o. s.	Wood box		10.7		229		104
Clutches and parts, automobile	do	15 units of 10 each	20.8	80	590	423	80
Clutch plate and transmission gears, automobile	do		5.7		271		47
Coal, U. S.	Bulk						42/48
Screened	do						46
Coal oil	Wood box	Tins	2.2		92		52
Do	55-gal. drum	None	9.2		425		48
Coal tar	Wood barrel	do	12.0		522		52
Coal-tar colors (aniline colors) (see also specific name)	do	do	10.4		488		48
Do	do	do	10.4		617		38
Do	Wood box	Cans	2.2		40		121
Do	do	do	.7		12		124
Do	Drum	None	8.0		275		64
Do	Cask	do	8.0		285		63
Do	Keg	do	3.6		99		81
Acid:							
Black	Wood barrel	do	3.0		123		55
Do	do	do	2.2		120		40
Do	do	do	8.7		315		62
Do	do	do	13.3		447		67
Blue	do	do	4.5		250		40
Do	do	do	6.9		240		65
Bordeaux	do	do	12.7		510		56
Green	do	do	12.7		280		101
Orange	do	do	11.3		292		87

Red	do	do	6.9		240		65
Do	do	do	2.2		55		88
Yellow	do	do	6.7		240		63
Azoic congo red	do	do	12.1		407		70
Basic green	do	do	12.3		284		98
Direct:							
Black	do	do	13.9		514		61
Do	do	do	12.7		490		58
Do	do	do	12.7		574		49
Do	do	do	4.8		240		45
Blue	do	do	11.0		425		42
Do	do	do	4.3		226		43
Do	do	do	6.9		240		65
Do	Keg	do	2.0		90		50
Dye	do	do	1.6		54		65
Green	Wood barrel	do	20.7		760		61
Violet	do	do	7.5		247		68
Methyl violet	do	do	11.9		516		52
Nigrosine	do	do	5.2		152		77
Safranine, basic	do	do	11.0		278		88
Sulfur black	do	do	10.7		491		48
Coal-tar derivatives (see also specific name)	Drum		12.9		235		123
Coal-tar dyes (see also specific name):							
Color lakes	Steel drum	None	12.0	120	691	571	39
Do	do	do	6.7	33	354	321	42
Do	Steel pail, 5-gal	do	1.2	5	61	56	42
Dry	Steel drum	do	8.8	50	500	450	39
Do	do	do	4.4	29	162	133	61
Do	do	do	1.8	11	61	50	66
Coal-tar intermediates (see also specific name)	Wood barrel		9.5		285		80
Alpha-naphtaylamine	do	None	11.9		417		64
Do	Keg	do	5.8		265		49
Aniline (aniline oil)	Steel drum	do	13.6	120	570	450	53
Do	Drum		10.7		547		41
Do	do		10.7		545		44
Do	do		10.7		513		47
Do	do		11.7		513		51
Do	Steel drum, ICC-5J, 55-gal	None	11.7	62	512	450	51
Aniline salts	Wood box		9.0		280		77
Do	Cask		31.7		777		90
Do	do		32.5		779		93
Do	Hogshead		30.4		764		89
Beta-naphthol (see also Naphthol)	Wood barrel	None	6.7		142		106
Do	do	do	12.7		265		107
Do	Keg	do	10.7		262		92
Do	Drum		11.0		303		81
Do	do		11.9		290		92
Do	Plywood drum	None	7.5	21	235	214	70
Dinitrochlorobenzol	Drum	do	21.8		1,291		41
H Acid	Wood barrel		12.7		324		88
Monochlorobenzol	Drum	None	24.2		1,200		45

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Taro weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Coal-tar intermediates (see also specific name)—Con.							
Naphthalene:							
Balls	Wood barrel	None	10.2		275		83
Crude	do	do	10.0	24	244	220	93
Flakes	Fiber carton		1.9		54		80
Do	Wood barrel	None	10.2		200		114
Green	Steel drum, 60-gal	do	12.3	40	480	440	58
Do	Steel drum, 30-gal	do	4.8	21	241	220	44
Do	Steel drum, 15-gal	do	3.5	15	125	110	62
Refined	Wood barrel	do	10.0	24	209	185	107
Refined, ball and flake	do		10.0	24	274	250	82
Nitrobenzol	Drum	None	24.2		1,200		45
Paranitraniline	Wood barrel	do	13.0		442		66
Do	Keg	do	5.6		135		93
Paraphenylenediamine	do	do	1.7		51		73
Do	Drum		11.7		390		67
Phenolphthalein	Wood box		4.4		143		69
Phenyl peri acid paste	Wood barrel		14.3		373		86
N. o. s.	Bag		1.6		76		46
Do	Drum		11.7		412		63
Do	Wood crate		6.0		258		50
Do	Wood barrel	None	10.0		255		88
Do	Drum	do	6.3		132		106
Do	do	do	9.8		230		95
Coal-tar pitch. (See Pitch, coal-tar.)							
Coat pads	Wood box		24.5		288		190
Cobalt oxide	Cask	None	13.7		942		32
Do	Keg	do	4.6		534		19
Coca Cola	Wood barrel	do	10.0		313		71
Cocoa	Fiber carton	24 paper bags, 1 lb. each	.8	3	27	24	68
Do	Wood box	16 units, 12 ½-lb. cans in each unit.	5.1	8	149	96	77
Do	do		1.8		52		79
Beans	Bags		3.3		143		51
Do	do		4.6		169		60
Do	do		6.7		203		74
Butter	Carton		1.1		62		38
Do	Bale		3.2		177		40
Do	do		3.4		181		42
Do	do		4.0		210		43
Do	do		4.2		212		44
Do	do		4.0		192		46
Do	Burlap bag	Paper liner	4.0	3	203	200	44
Do	Fiber carton	do	1.1	2	57	55	43
Do	Wood box	Tin lining	6.1	45	265	220	52

Do	Fiber carton		1.3		79		38
Do	Bale	None	3.0		184		40
Do	do	do	4.0		191		45
Do	do	do	3.0		210		35
Do	Wood box						55
Malt	Fiber carton		.5		17		73
Powdered	Wood barrel	Paper liner	10.0	23	208	185	108
N. o. s.	Bag	None					70
Coconut:							
Desiccated	Wood box	Tins	5.2	23	123	100	95
Do	do	do	5.2	23	153	130	76
Shredded	do						72
Sliced	do		5.0		150		75
Coconut oil	Barrel		13.7		506		60
Do	do		15.2		500		68
Processed (Lorol alcohol)	Drum	None	24.9		870		64
Coconut shells	Bag	do					96
Coconuts	do	do					31
Codfish	Wood box		3.0		100		68
Do	do		2.6		75		78
Do	Bag	None	1.3		50		58
Fresh	Wood barrel	do	9.6		358		60
Cod oil (for industrial, not medicinal, purposes)	Drum	do					57
Coffee:							
Green	Bag	do					75
Do	do	do					62
Do	do		5.5		178		69
Do	do		3.3		132		55
Do	do		3.3		134		50
Do	do		4.4		145		69
Do	do		6.4		134		107
Cuba	do		4.7		154		69
Dominican Republic	do		5.0		165		68
Roasted	Carton		.7		17		100
Do	do		.7		18.5		96
Do	Wood box	Tins					60
Do	do	do	1.0		18		93
Do	do	do	3.3		86		86
Do	Fiber carton	1 can, 25 lb. each	1.4	2	30	25	107
Do	do	4 cans, 5 lb. each	.9	2	27	20	77
Do	do	12 cans, 1 lb. each	.8	1	18	12	97
Do	do	12 bags, 1 lb. each	.6	1	14	12	93
Substitutes	do	12 pkgs., 18 oz. each	.7	3	16	14	93
Coil packing. (See Packing.)							
Coil-winding machinery	Wood box		5.0		169		67
Coke	Bag	None	4.7		114		92
Connellsville	Bulk						75
Petroleum	Bag	None					100
Do	do	do	5.4		145		83
Do	Bulk						85/100
Cold cream (see also Toilet)	Bundle, 3 cartons	Jars	1.6		55		63
Cold cream jars	Wood box						68
Collodion and collodion cotton	Drum	None					92

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Collodion cotton (nitrocellulose, wet)	Steel drum	None	13.5	110	460	350	66
Do	do	do	12.0	70	209	229	90
Do	Steel barrel	do	11.0	90	336	246	73
Collops, canned	Wood box	Tins	.7		35		50
Color lakes. (See Coal-tar dyes.)							
Colors, aniline. (See Coal-tar colors.)							
Colors in oil:							
Burnt Turkey, umber brown	do	12 cans, 1 gal. each	3.0	18	186	158	36
Do	do	48 cans, ½ pt. each	1.0	9	57	40	40
Chrome, medium green	do	24 cans, 1 qt. each	1.9	12	149	129	28
Do	do	48 cans, ½ pt. each	1.0	9	82	65	27
Dragon red	do	12 cans, 1 gal. each	3.0	18	180	152	37
Do	do	48 cans, ½ pt. each	1.0	9	57	40	40
Golden ochre yellow	do	12 cans, 1 gal. each	3.0	18	219	101	31
Do	do	48 cans, ½ pt. each	1.0	9	63	46	36
Lampblack	do	12 cans, 1 gal. each	3.0	18	138	110	49
Do	do	48 cans, ½ pt. each	1.0	9	44	27	51
Prussian blue	do	12 cans, 1 gal. each	3.0	18	150	122	45
Do	do	24 cans, 1 qt. each	1.9	12	81	61	51
Do	do	48 cans, ½ pt. each	1.0	9	47	30	49
Combines. (see Agricultural machinery.)							
Combs, toilet, celluloid	do		12.7		301		95
Compasses	do		1.0		10		224
Compound, liquid lining	Drum	None					38
Compound, purifying, iron or steel	Wood box						34
Comptometer	do		5.7		204		63
Concrete mixer	Wood crating	None	253.0	470	4,585	4,115	124
Do	do	do	185.0	325	3,525	3,200	118
Do	Wood box		172.8		4,830		80
Do	do						80
Conduit, aluminum, rigid	do	Packing material	12.2	105	520	416	52
Cones, ice cream	do						335
Coney pelts	Bale	None	21.3		451		106
Do	do	do	22.4		433		116
Do	do	do	12.3		197		130
Do	do	do	20.8		477		140
Do	do	do	30.3		482		169
Shredded	do	do					105
Cookers, n. o. s.	Wood box		27.0		480		126
Cooking utensils, aluminum (see also other utensils):							
Assorted	Plywood box	Packing material	33.8	91	233	142	320
Do	do	do	15.5	51	147	96	249
Kettles	Wood box	24 cartons	7.3	26	67	33	249
Do	do	12 cartons	3.7	16	39	17	204
Do	do	6 cartons	1.8	10	23	9	172

Pans	do	24 cartons	2.5	14	38	21	149
Do	do	do	1.8	10	28	15	140
Do	do	do	1.2	6	19	11	140
Pots	do	12 cartons	24.4	78	250	156	224
Do	do	6 cartons	12.2	42	130	78	204
Do	do	24 cartons	3.9	15	48	27	187
Do	do	12 cartons	2.2	10	28	14	172
Ware	Fiber carton		3.3		28		264
Cooperage stock	Bundle	None					90
Do	do	do	6.6		153		97
Copper (see also specific product):							
Anodes	Piece		1.2		525		5/6
Bars, wire (each)			.5		148		8
Billets	Pieces		.4		78		10
Cable, insulated	Reel		50.4		1,933		60
Flake	Bale	None					78
Ingots	Wood barrel	do	7.7		1,300		14
Plates, perforated	Wood box		5.8		314		41
Powder	Drum	None	6.0		795		17
Do	do	do	5.3		772		15
Rods. (See Copper, brass or bronze.)							
Scrap	Wood box		4.4		250		40
Do	do		4.0		195		46
Do	Briquette		.3		74		10
Do	Barrel		25.5		1,416		40
Do	do		30.0		824		81
Do	do		40.7		1,102		83
Do	do		28.0		725		86
Sheets. (See Copper, brass or bronze.)							
Slabs	Loose		.4		129		7
Slugs	Wood box		1.0		164		15
Copper, brass or bronze:							
Rods:							
3-ft	do	Paper liner	1.9	30	330	300	13
8-ft	do	do	4.2	35	535	500	19
12-ft	do	do	3.1	35	335	300	21
20-ft	do	do	7.6	90	590	500	29
Sheets:							
Coils, 30-in	do	None	5.7	46	546	500	23
Coils, 20-in	do	do	4.0	36	536	500	17
Rolls	Wood barrel	do	5.8	27	527	500	25
Do	do	do	3.6	22	522	500	15
Sheets:							
4′ x 24″	Wood box	Paper liner	5.0	46	546	500	20
6′ x 30″	do	do	6.9	66	566	500	27
8′ x 36″	do	do	9.1	85	585	500	35
8′ x 36″	do	do	11.3	111	611	500	41
10′ x 14″	do	do	4.9	50	550	500	20
Strips:							
12′ x 12″	do	do	5.8	66	566	500	23
8′ x 6″	do	do	2.4	40	240	200	22
8′ x 4″	do	do	2.2	30	130	100	37
8′ x 12″	do	do	5.8	50	550	500	24

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Copper carbonate, 20 percent and 52 percent	Wood barrel	Paper liner	10.0	26	276	250	81
Do	do	do	10.0	26	226	200	99
Do	Fiber carton	Fiber cartons	1.6	2	55	50	63
Do	do	do	1.2	2	55	50	49
Copper sulfate (see also Bluestone):							
Basic	Steel drum	None	2.6	7	107	100	54
Do	Fiber carton	Fiber cartons	1.0	2	55	50	42
Granular crystals	Wood barrel	None	10.0	24	524	500	43
Monohydrated	Steel drum	do	9.5	15	415	400	51
Do	do	do	4.7	11	211	200	50
Do	do	do	2.6	7	107	100	54
Powdered	Wood barrel	do	10.0	24	424	400	53
Do	do	Paper liner	10.0	25	425	400	53
Do	Cloth bag	None	1.5	2	102	100	33
Do	Fiber carton	Fiber cartons	1.0	2	55	50	42
Cordage	Roll	None	2.8		86		76
Hemp, halibut line	Cloth bale	do	5.1	2	202	200	57
Do	do	do	3.9	2	98	96	90
Corduroy, cotton:							
984 yd	Plywood box	12 rolls	63.7	78	787	700	187
492 yd	Fiber carton	6 rolls	29.5	52	456	400	149
82 yd	do	1 roll	5.4	6	81	74	149
Cores, paper	Wood box						153
Cork:							
Blocks	Crate		22.7		357		143
Disks	Bag		23.7		292		182
Do	Carton		4.1		43		213
Do	do		4.2		43		217
Disks or rods	Bale	None					256
Do	Wood box						129
Rock	Crate		17.0		345		110
Sheets	Wood box		8.7		282		69
Do	do		8.8		288		69
Do	do		8.8		277		71
Do	do		9.3		278		75
Do	do		9.3		302		75
Do	do		16.6		449		82
Do	Crate		30.5		510		134
Waste	Bale	None					214
Corks	Can	do	9.0		80		250
Corn	Bulk						49/50
Do	Bag	None					54/56
Canned	Wood box	6 cans, No. 10	1.2	9	53	40	50
Do	do	24 cans, No. 2	1.0	8	43	30	52

Shelled	Bag	None	3.0		107		63
Do	Wood box		12.0		200		136
Corn:							
Flour	Wood barrel	None	6.7		217		65
Do	Bag	do	2.7		112		55
Do	Single burlap bag	do	3.4	1	141	140	54
Do	Burlap bag	Paper bag	3.4	2	142	140	54
Do	do	Burlap bag	3.4	2	142	140	54
Do	do	None	3.3	1	141	140	53
Do	Wood box	Cardboard boxes	1.3	14	54	40	54
Do	Solid fiber carton	do	1.2	7	47	40	57
Meal	Wood box	24 tin cans	1.4	21	69	48	51
Do	do		2.3		100		51
Oil	Steel drum	None	11.7	51	484	433	54
Do	Wood box	Tin boxes	2.2	21	91	70	54
Do	Steel drum	None	12.0	50	450	400	59
Do	Wood barrel	do					58
Starch	Single burlap bag	do	3.4	1	141	140	54
Do	Burlap bag	Paper bag	3.4	2	142	140	54
Do	Bag		4.0		141		62
Do	Wood box	Boxes	1.5		60		56
Do	do	Cardboard boxes	1.3	14	54	40	54
Do	Solid fiber carton	do	1.2	7	47	40	57
Do	Bag		3.0		141		52
Do	Cloth bag	None	7.0	2	282	280	56
Do	Wood drum	do	7.5	23	273	250	61
Do	Cloth bag	do	3.8	1	141	140	59
Do	Wood drum	do	3.8	11	136	125	62
Sugar	Bag	do	2.0		101		50
Do	Burlap bag	Paper bag	2.3	2	102	100	50
Syrup. (See Glucose.)							
Corn huskers. (See Huskers.)							
Corn sheller	Wood crate		15.6		310		113
Corn sheller and parts	Wood box		60.4		873		155
Do	do		1.6		95		37
Cornstarch. (See Corn.)							
Corsets	do		17.6		240		164
Do	do		12.0		100		270
Do	do		26.2		320		183
Cots, knocked-down	Wood crate		4.7		99		106
Cotton:							
Absorbent	Wood box		11.4		151		169
Do	do		15.2		166		205
Compressed:							
High density	Bale		17.0		532		71
Do	do		20.0		522		86
Do	do		23.1		500		103
Standard	do		34.7		563		138
Do	do		47.5		542		196
Do	do		47.5		500		213
Raw	Cloth bale	None	16.0	23	510	487	70
Do	do	do	12.7	2	252	250	112
Cotton and cotton linters, high density	Bale	do					80

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Cotton goods. (See Textiles, and specific name.)							
Cotton linter pulp. (See Cottonseed.)							
Cotton waste:							
High density, compressed	Bale	None	16.7		537		70
Do	do	do	19.7		563		78
Standard	do	do	47.3		807		131
Do	do	do	33.3		567		132
Do	do	do	33.3		531		141
Do	do	do	41.4		620		150
Do	do	do	35.7	39	555	516	140
Do	do	do	36.0		525		155
Do	do	do	48.0		525		205
Cottonseed	Bag						70
Do	do	None	1.8		48		86
Cottonseed meal	do						51
Cottonseed oil	Wood barrel	None					60
Do	Steel drum	do	12.0	50	450	400	59
Cottonwood lumber							120
Couplers, car	Piece		3.3		222		36
Couplings, iron pipe (see also other types)	Bale	None	1.5		90		37
Crab meat	Wood box	Tins					47
Do	do	do	1.7		72		52
Do	do	do	2.0		80		56
Crackers	do	do	26.0		220		260
Do	do		3.5		71		112
Do	do		5.4		81		149
Do	Wood barrel	None	7.0		71		221
Soda	Fiber carton	Cardboard boxes					203
Do	Wood box		2.3		35		144
Cranberries, ordinary	do						70
Do	Wood barrel	None	5.4		140		94
Crayons	Wood box	Cardboard boxes	10.0		275		81
Do	do	do	8.3		233		80
Cream of tartar (potassium bitartrate)	Wood barrel	Paper liner	6.6	26	250	224	59
Do	do	do	8.4		272		69
Do	do	do	11.1		270		92
Do	Barrel		8.4		272		69
Creams. (See Cold cream; Shaving; Toilet.)							
Creosol solution	Wood box		2.0		95		47
Creosote	do	12 cans, 1 gal. each	3.0	18	135	106	50
Do	do		11.1		246		100
Do	Wood barrel	None	13.0		480		60
Cresol (see also Meta cresol)	Wood box	6 cans, 1 gal. each	1.8	12	69	52	59
Do	do	12 cans, 1 gal. each	3.0	18	133	104	51

Crucibles	Wood barrel	None	9.5		166		130
Do	Wood box		4.0		130		68
Crude oil	Bulk						45
Do	Wood barrel	None	12.0		450		59
Crutches	Wood box		35.0		425		180
Crystals, synthetic	Wood barrel	None	10.0		226		95
Cultivators	Wood box						186
Cups, paper	Fiber carton		.9		12		172
Do	do		4.7		57		183
Do	do		1.3		14		205
Do	do		2.7		28		220
Curios	Wood box		15.0		160		205
Do	Wood barrel		14.0		112		275
Currants, preserved, dried	Wood box						50
Cutlery	do		5.0		205		54
Do	do		2.5		75		77
Do	do		4.9		220		50
Do	do		3.7		222		37
Do	do		3.0		84		80
Do	do		11.8		218		122
Do	do		6.2		116		119
Cutting compound	Wood barrel	None	12.0		499		54
Cyanamid	Bag		1.7		114		33
Cyanide, crude	Drum		4.5		216		47
Cylinder heads, automobile	Wood box		3.0		100		35
Do	do		4.5		275		36
Cylinders:							
Empty	Piece		14.0		652		50
Steel	do		.5		28		40
Do	do		.8		45		49
Do	do		3.5		194		38
Do	do		2.3		99		53
Do	do		7.0		448		65
Gas	do		3.0		128		47
Dairy and poultry feed, mixed. (See Feed, mixed.)							
Dairy machinery:							
Cream separators:							
800-lb. capacity	Wood box	None	7.9	31	170	139	104
550-lb. capacity	do	do	6.9	26	156	130	100
Pasteutizers, coil:							
800-gal. capacity	Skids, boxed	do	460.0	1,425	4,450	3,025	232
300-gal. capacity	Wood box	do	239.0	1,025	2,975	1,950	180
Damar. (See Resin, natural.)							
Dental:							
Cream	Case		6.0		185		73
Cabinets	Crate		54.0		750		161
Equipment and supplies, n. o. s	Wood box		4.5		175		57
Do	do		2.2		75		65
Do	do		4.0		91		98
Do	do		3.4		75		102
Furniture. (See Furniture.)							
Powder	do	Packages	23.0		512		102
Do	Fiber carton	do					95

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Deodorants, moth	Fiber carton		1.9		61		70
Do	Wood box		6.3		225		63
Depilatory	Drum	None					60
Depressors, tongue, wooden	Wood box						62
Desk-light shades	Wood crate		12.5		115		242
Desks:							
School							109
Steel	Plywood box	Packing material	49.2	145	455	290	249
N. o. s	Wood box		42.0		395		250
Knocked-down	Wood crate		18.4		207		199
Detonators	Wood box		1.0		41		55
Do	do		1.1		66		37
Do	do		3.2		87		82
Dextrine	Bag	None	3.1		142		49
Do	do	do	3.0		101		70
Do	do	do	7.0		281		55
Do	Wood barrel	do	9.0		299		67
Tapioca	do	do	6.0		204		65
Diacetone	Steel drum, ICC-5E, 55-gal	do	11.7	52	477	425	55
Technical	do	do	11.7	52	462	410	57
Diamyl hydroquinone	Drum		2.9		75		87
Dibutyl phthalate	Steel drum, ICC-5-E, 55-gal	None	11.7	52	532	480	49
Do	Steel drum, ICC-5E	do	11.7	52	522	470	50
Dichloro-difluoro methane	Cylinder	do					36
Dichloromethane	Drum		12.0		607		44
Dictaphone record blanks	Fiber carton		2.3		37		136
Diesel oil	Steel drum, 55-gal	None	11.6	51	419	368	62
Diethylamine	Drum		11.7		367		71
Diethylaminoethanol	Steel drum, ICC-5E	None	11.7	52	442	390	59
Diethyl sulfate	do	do	11.7	52	582	530	45
Diethylene glycol	do	do	11.7	52	552	500	47
Do	Drum	do	11.2		384		65
Do	do		11.2		552		45
Dimethyl phthalate	do		11.7		558		47
Dinitrochlorobenzol. (See Coal-tar intermediates.)							
Dish drainers	Wood box		4.8		75		145
Disinfectant, agricultural	Drum	None					49
Disks (see also Agricultural machinery):							
Brass	Wood box		2.8		731		9
Steel	do		1.3		197		15
Tin	Wood barrel		9.0		249		81
Dolls:							
Celluloid	Wood box		27.3		150		408
N. o. s	do		14.5		130		249
N. o. s	do		22.7		255		200

Door:							
Bells							93
Closers	Wood box	6 cartons	3.1	21	103	78	68
Do	do	do	3.1	21	84	60	82
Locks. (See Locks.)							
Springs	do		4.3		249		39
Doors	Wood crate	None	13.5		225		134
Cold storage	Bundle	do	58.9		625		211
Dowels, wooden	Crate		17.8		552		72
Do	Box		17.9		539		74
Do	Bundle		3.2		104		68
Do	do		1.4		41		83
Dress forms	Wood box		3.0		25		268
Dresses:							
Cotton	do						190
N. o. s.	do		34.7		350		222
Dressing:							
Automobile top	do	12 cans, 1 gal. each	3.0	18	114	86	59
Do	do	24 cans, 1 pt. each	.9	8	35	22	59
Belt	do		2.0		48		91
Leather	do						60
Shoe	do		1.5		45		75
Do	do		3.6		122		66
Driers, japan	do	12 cans, 1 gal. each	3.0	18	115	86	59
Do	do	24 cans, 1 qt. each	1.9	12	61	41	56
Do	do	24 cans, 1 pt. each	.9	8	40	23	52
Drilling, cotton	do		19.0		410		100
Drill parts, electric	do		1.7		60		62
Drills:							
Bench	do		2.7		64		96
Breast	do		7.2		225		72
Hand	do		8.4		228		83
Do	do		2.1		47		99
Post	do		10.6		189		125
Radial, plain	do		58.9		2,465		53
Twist. (See Twist drills.)							
Drugs, n. o. s.	do		7.0		132		113
Do	do		2.0		74		72
Do	Package		4.0		93		105
Drugs, pills, and plasters	Wood box		5.1		69		165
Drums for rubber	Loose		3.3		32		233
Drygoods, n. o. s.	Wood box		38.8		307		283
Do	do		24.4		300		182
Dungarees, cotton	Bale	None	1.3		31		90
Duplicating machine (see also specific name)	Wood box	do	5.3	37	80	43	149
Do	do	1 carton	3.0	22	61	29	112
Dust brushes. (See Brushes.)							
Dust collectors, fine	Bag		1.0		113		18
Do	do		1.4		127		25
Do	do		1.5		102		33
Dyes and dyestuffs, n. o. s. (see also Coal-tar dyes, and specific name).	Wood barrel						51

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Dyestuffs, n. o. s.	Drum		8.7		445		44
Do	do		3.4		116		66
Do	do		7.7		244		71
Do	do		8.7		273		72
Do	do		11.8		363		74
Do	do		12.0		292		92
Do	do		12.0		288		93
Do	do		11.7		272		96
Dyewood extract (see also Logwood)	Wood box		0.9		56		39
Do	Wood barrel		12.0		636		42
Do	do		11.3		570		44
Do	do		12.7		642		44
Do	do	None					50
Do	do	do	14.0		585		52
Dynamite	Wood box		2.0		60		75
Do	do		1.4		63		49
Do	Wood box, tin-lined	None	1.2	9	59	50	47
Caps	Wood box		2.4		110		49
Earth. (See Fuller's; Infusorial.)							
Ebonite	do		5.6		189		66
Do	do		4.4		167		59
Do	do		4.0		211		42
Egg:							
Albumen	do						51
Do	Case		6.5		239		61
Yolk:							
Dried	do		7.1		240		66
Do	do		7.9		252		70
Do	do		4.3		135		71
Frozen, in cans	do		.7		46		36
Do	do		.8		32		58
Egg beaters	Wood box		4.2		88		100
Do	do		8.2		130		142
Do	do		8.2		151		122
Do	do						100
Egg case fillers, knocked-down	do						108
Eggs (see also Egg):							
Dried	Case		4.2		134		70
Frozen	Cylindrical tin can	None	1.6	2	32	30	112
In the shell	Wood box	Fillers and cup flats	2.3	12.5	58.5	46	88
Do	Case		2.3		53		97
Elastic waste, seconds	Wood box						164
Elastic webbing	Case		26.0		603		96
Do	do		12.6		208		105
Do	do		20.0		606		107

Electric:							
Appliances	Cartons		2.7		25		246
Batteries. (See Batteries.)							
Bulbs. (See Bulbs.)							
Cable. (See Cable.)							
Fans. (See Fans.)							
Fixtures	Wood box		4.7		130		80
Light, wall and ceiling	Wood crate						370
Lighting, n. o. s.	Wood box						390
Fuses	do		5.2		110		106
Do	do		3.2		70		102
Meter parts	Case		2.2		40		121
Do	do		8.3		281		66
Meters	Cartons		.3		16		35
Do	do		.7		28		60
Mixers	Case		2.7		38		162
Plants, automatic	do		23.3		1,600		33
Do	do		17.8		596		67
Shavers	do		2.1		34		137
Switches	Wood box		9.2		214		96
Do	do		3.2		73		97
Electrical equipment (see also specific name):							
Air-conditioning. (See Refrigerator equipment.)							
Circuit breakers:							
240 v., 800 a.	do	None	40.0	240	920	680	97
Enclosed; 750 v., 2,000 a.	do	do	150.0	650	2,500	1,850	134
8 panels; 750 v., 2,000 a.	do	do	375.0	1,800	4,500	2,700	187
Oil:							
750 v., 2,000 a.	do	do	15.0	170	370	200	91
15,000 v., 2,000 a.	do	do	150.0	1,000	4,500	3,500	75
34,500 v., 600 a.	do	do	275.0	1,935	5,200	3,265	118
69,000 v., 1,200 a.	do	do	1,200.0	4,825	15,075	10,250	178
Converter, synchronous	Skid and boxes	do	900.0	6,550	46,050	39,500	44
Exciter	do	do	204.0	3,400	16,000	12,600	29
Do	Wood box	do	33.4	125	1,675	1,550	45
Do	do	do	20.4	80	925	845	49
Generators:							
Direct current	Skids and boxes	do	2,405.0	18,000	118,000	100,000	46
20-kw	Wood box	do	32.4	170	1,200	1,030	60
15-kw	do	do	12.3	75	560	485	49
5-kw	do	do	5.8	50	325	275	40
2-kw	do	do	2.7	40	185	145	33
1-kw	do	do	2.4	22	125	103	42
N. o. s.	do		36.3		1,525		53
Do	do		2.9		102		64
Do	Wood crate		22.3		191		258
Do	Wood box		4.3		226		44
Motor and generator	do	None	130.2	650	6,450	5,800	45
Do	do	do	50.3	715	3,815	3,100	35
Motor or generator	do	do	111.2	515	7,315	6,800	34
Do	do	do	114.7	702	5,302	4,600	49
Do	do	do	85.1	406	3,206	2,800	59
Do	do	do	39.4	272	1,472	1,200	61

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Electrical equipment—Continued.							
Motors	Wood crate	None	7.8		308		45
Parts	Wood box		6.0		187		65
Motors, alternating current:							
Induction, squirrel-cage	do	None	8.7	48	368	320	53
Do	do	do	5.7	38	243	205	53
Do	do	do	3.1	22	130	108	53
Do	do	do	2.1	16	91	75	52
150-hp	Skid and box	do	52.0	365	3,050	2,685	38
Synchronous, 250-hp	do	do	149.0	450	5,550	5,100	61
Motors, direct current:							
20-hp., 850 r. p. m.	Wood box	do	32.4	170	1,200	1,030	60
15-hp	Skid and box	do	11.0	100	554	445	45
10-hp	Wood box	do	12.3	75	560	485	49
7½-hp	do	do	5.8	50	325	275	40
2-hp	do	do	2.7	40	185	145	33
1-hp	do	do	2.4	22	125	103	42
Electrodes	Case		18.3		761		54
Do	do		15.4		498		69
Do	Wood box		16.0		720		50
Carbon (see also Brushes and electrodes)	do						60
Graphite	do	Packing material	17.8	114	608	494	66
Do	do		13.0		587		50
Welding	Solid fiber carton	Metal box	.3	2	52	50	13
Do	Case		.5		21		54
Electrolyte, dry	Wood box		3.8		88		98
Electrotypes	do		.9		25		82
Elevator:							
Controller	do	None	51.5	250	930	680	124
Generator	Wood crate	do	13.4	80	1,010	930	30
Machine	do	do	91.7	415	3,240	2,825	64
Parts	Wood box		14.7		422		78
Emery:							
Cloth	do						52
Cord	do						136
Paper (see also Sandpaper)	Bale	None	2.2		112		43
Do	Wood box		9.0		388		52
Wheels	Wood barrel	None	11.9		397		67
Do	do	do	8.6		454		42
Do	do	do	10.2		344		65
Do	Wood box		6.7		300		50
Do	do		5.0		284		39
Do	do		2.6		130		45

Enamels:							
Black	Wood box, tin-lined	12 cans, 1 gal. each	3.0	18	120	92	56
Do	do	24 cans, 1 qt. each	1.9	12	67	47	61
Do	Wood box	24 cans, 1 pt. each	.9	8	36	23	56
Black screen	do	12 cans, 1 gal. each	3.0	18	114	86	59
Do	do	24 cans, 1 qt. each	1.9	12	63	43	66
Do	do	24 cans, 1 pt. each	.9	8	34	21	59
Green	do	12 cans, 1 gal. each	3.0	18	132	104	51
Do	do	24 cans, 1 qt. each	1.9	12	75	55	55
Industrial, white	do	12 cans, 1 gal. each	3.0	18	132	104	51
Enamelware	do		3.9		55		159
Do	do		18.4		224		184
Do	do		8.7		102		190
Do	do		17.7		241		167
Do	Wood crate		14.7		185		177
Engine oil	Steel barrel	None	11.0		520		48
Engines:							
Compressor	Wood box		53.0		1,731		68
Diesel	do		8.8		277		71
Accessories	do	None	18.2	240	822	582	49
Gasoline, and parts	do		4.3		120		80
Gasoline, industrial	do	None	90.4	600	2,460	1,860	82
Do	do	do	61.0	610	2,130	1,520	64
Do	do	do	41.3	360	1,180	820	78
Do	do	do	22.8	250	810	560	63
Do	do	do	21.3	210	630	420	76
Internal combustion	Case		28.3		965		66
Kerosene	Wood box	None	9.0	81	366	285	55
Marine	do	do	148.8	821	4,480	3,659	75
Do	do	do	86.2	530	2,610	2,080	75
Do	do	do	61.4	565	1,820	1,255	75
Do			18.3		725		56
Do	Wood box		202.0		5,520		83
Diesel	do	None	84.7	938	3,930	2,992	48
With propeller	Case		10.5		550		79
Steam:							
100-hp	Skid and wood box	None	327.3	1,080	9,900	8,820	75
80-hp	do	do	290.3	1,300	8,900	7,600	72
50-hp	do	do	147.7	950	5,800	4,850	80
30-hp	do	do	132.0	845	3,780	2,935	77
20-hp	Wood box	do	80.8	540	2,440	1,900	75
8-hp	do	do	40.8	255	1,305	1,050	70
Tractor	do		105.0		4,240		55
Diesel	Case		5.4		6,699		54
N. o. s.	do		12.4		300		93
Envelopes	Wood box		9.5		180		118
Do	do		22.6		425		119
Do	do		14.0		208		151

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Essential oils. (See specific name.)							
Ethyl:							
Acetate. (See Acetate.)							
Alcohol. (See Alcohol.)							
Chloride. (See Chloride.)							
Ether	Steel drum, ICC-5J	None	12.0	60	370	310	73
Fluid	Drum	do	13.0		921		30
Do	55-gal. drum		12.7		896		32
Do	10-gal. drum		3.0		173		38
Ethylene	Drum	None	12.0		615		42
Dichloride	Steel drum, ICC-5E	do	11.7	53	613	560	43
Do	Drum		10.7		613		39
Glycol	do		10.7		550		44
Do	do		11.7		553		47
Do	Steel drum, ICC-5E	None	11.5	50	550	500	47
Do	Steel drum, ICC-5	do	1.2	7	52	45	52
Do	Wood box, ICC-5A	1-gal. can	.8	9	23	9	74
Glycol ether. (See Cellosolve.)							
Excelsior	Bale		23.1		200		258
Compressed	do		8.4		142		132
Extracts. (See specific name.)							
Fan belts	Case		.7		18		93
Do	do		4.7		76		137
Fans:							
Automobile	do		16.2		221		163
Electric	Carton		3.2		32		222
Do	do		3.3		33		226
Do	do		5.0		50		224
Do	do		2.9		26		247
Do	Wood box		13.7		300		100
Farina	do	24 tin cans	1.4	21	69	48	51
Do	Bag	None					55
Fasteners:							
Iron, corrugated	Wood box		17.0		111		34
Iron, wooden-joint	Case						36
Snap	Wood box		1.9		67		64
Do	do		14.0		180		174
Do	do		16.5		248		149
Do	do		15.9		360		99
Faucets:							
Brass	do	1 box, 32 doz	.7	35	375	312	53
Self-priming	do		2.1		69		68
Feathers	Bale		25.4		283		201
Do	do		41.8		423		222
Do	do		42.0		400		235
Do	do		32.3		305		237

Do	do		37.8		324		261
Do	do		33.3		205		363
Do	Bag		22.0		125		393
Do	Bale		47.0		083		153
Do	do		48.0		434		248
Do	do		59.0		824		160
Do	do		20.0		217		205
Do	do		57.0		809		160
Do	do		59.0		859		155
Feed, mixed (see also specific name):							
Dairy and poultry	Burlap bag	None	2.5	1	101	100	55
Do	do	do	3.0	1	101	100	66
Livestock and poultry	do	do		1	101	100	63
Milk	Cloth bag	do	2.5	1	101	100	56
Do	Paper bag	do	.8	1	26	25	72
Feenamint	Fiber carton	Cardboard boxes	1.0		25		90
Feldspar	Bag		1.3		101		29
Do	do		1.5		101		33
Do	do		5.8		375		35
Do	do		6.9		389		40
Do	Wood box		6.0		334		42
Ground	Wood barrel	Packing material	7.3	20	370	350	44
Do	Paper bag	do	.9	1	101	100	21
Fellies	Bundle	None	4.2		50		190
Felt (see also specific name):							
Asbestos	Crate		6.3		238		60
Asphalt, saturated	Roll	None					48
Dead	do	do	4.0		75		116
Paper	do	do	1.7		51		75
Roofing	do	do	2.2		43		112
Do	Wood crate		6.6		206		72
Sheets	Wood box		5.0		90		125
Woolen	Bale	None	21.0		150		313
N. o. s.	Wood crate		13.3		358		84
Fencing:							
Chain link	Roll	None	22.5		60		830
Wire	Package	do	7.7		155		101
Do	Roll		3.9		78		112
Do	do		6.0		113		119
Do	do		7.3		120		135
Do	do		7.1		100		159
Do	do		4.3		53		183
Do	do	None					179
Do	do	do	3.9		76		115
Woven wire	do						63
Do	Roll, 100-ft	None	7.4		238		63
26″ wide	do	do	6.5		131		112
39″ wide	do	do	7.7		170		102
60″ wide	do	do	6.5		105		140
Ferrochrome	Steel drum	do	3.8	10	510	500	17
Do	do	do	.6	3	103	100	13
Do	Wood barrel		11.5		1,397		18
Do	do		11.9		1,352		20

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Ferrochrome—Continued.							
Crushed	Wood barrell	None	12.9	73	1,773	1,700	16
Do	Wood keg	do	4.1	31	571	540	16
Lump	Wood barrel	do	12.9	73	1,573	1,500	18
Do	Wood keg	do	4.1	31	481	450	19
Ferromanganese	Wood barrel	do	10.3		1,350		16
Ferrosilicon	do		7.3		825		20
Do	do		9.2		775		26
Do	Drum		1.1		60		40
Do	do		1.3		60		47
Do	Wood barrel	None	13.0	75	590	515	49
Ferrotitanium	Wood box						16
Ferrotungsten	Steel drum	None	2.0	12	612	600	7
Do	do	do	1.6	11	461	450	8
Do	Drum	do					10
Ferrotype plate	Wood box		.6		50		26
Do	do		.6		60		25
Ferrovanadium	Keg	None	1.3		192		16
Do	do	do	1.7		236		16
Fertilizer, n. o. s	Bag	do	6.0		202		66
Fiber:							
Sheet	Wood crate		20.0		973		45
Vulcanized	Wood box		16.2		574		63
Do	Roll		2.0		112		45
Do	Bundle		3.8		168		52
Do	Case		8.7		460		40
Do	do		8.7		428		46
Do	do		20.5		945		49
Do	do		25.2		1,005		56
Do	do		10.8		377		64
Do	do		29.5		928		71
Do	do		17.4		444		88
Rods	Wood box	None	25.0	148	738	590	76
Sheets	do	do	19.5	190	990	800	44
Do	Wood crate	do	22.3	141	1,071	930	47
Do	Burlap-covered roll	do	4.0	2	222	220	40
Do	Wood box						67
Tubes	do	None	32.4	152	500	348	15
Tubing	do						108
Figs:							
Canned	do	Cans	1.2		53		47
Do	do	do	1.5		44		48
Dried	do	None	1.4	6	56	50	56
Do	do	do	.6	3	28	25	50

Do	do	10 bags, 10 lb. each	2.7	25	125	100	49
Do	do	24 bricks, 8 oz. each	.3	2	14	12	42
Files	Case		1.9		170		25
Do	do		1.3		140		21
Do	do		1.7		156		25
Steel	do		1.8		240		17
Do	do		2.0		209		21
Do	do		1.9		188		23
Filing cabinet parts	Wood box		7.0		198		82
Filing cabinets	Case		6.1		154		88
Do	Wood box		28.0		390		160
Do	do	None	5.0		48		225
Steel	do		13.8		244		127
4-section	do	Packing material	21.6	115	294	179	164
Do	Plywood	do	17.2	34	213	179	179
Do	Wood box	do	21.7	69	240	151	204
Visible-record	do	None	5.9	48	176	128	75
Filler, paste wood	do	24 cans, 1 qt. each	1.9	12	107	87	39
Do	do	48 cans, ½ pt. each	1.0	9	62	45	36
Film scrap, cleaned	Wood barrel	None	15.0		443		77
Film scrap, uncleaned	do	do	12.5		362		77
Film support, n. o. s	Wood box		7.0		217		70
Do	Case		8.0		358		50
Do	do		10.3		407		57
Do	do		10.0		250		90
Films:							
Exposed, for Cine-Kodaks	Wood box						77
Motion-picture	Case		3.3		113		66
Do	do		1.7		60		65
Do	Can		.7		33		45
Do	do		.7		38		44
Do	Wood box	80 cans in cartons	14.8	38	570	425	59
Photographic	do	Paper-wrapped	16.0	58	650	578	55
Unexposed	Case		10.2		262		87
Do	do		3.6		96		83
Filter, air window	Wood box						456
Filter. (See also specific name.)							
Cloth	do		4.5		136		74
Do	Roll		5.4		128		95
Mass	Fiber carton						159
Do	Wood box		7.5		154		109
Sheets, asbestos	Crate		68.0		836		182
Do	do		64.3		753		191
Fire:							
Equipment	Wood box		7.0		254		60
Extinguishers	do						65
Copper	do		3.5		250		30
Fluid	do		4.2		212		44
Do	do		3.2		210		34
Extinguishing compound	Pail		1.1		51		48
Do	Case		1.5		70		48
Firestones for cigar lighters (see also Stone)	Wood box		1.5		95		35

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Fish (see also specific name):							
Dressed, fresh	Wood box	Ice	6.9	50	250	200	62
Do	do	Ice and water	3.8	35	135	100	62
Dried	do		8.0		181		100
Frozen	do		9.5		300		71
Do	do		9.2		260		78
Live, gold, or tropical	Can						93
Salt	Bag	None	11.9		218		125
Do	Wood box		4.0		185		50
Do	Cask	None	13.5		720		45
Do	Keg	do	2.0		90		55
Fish meal	Bag	do	18.4		170		243
Do	do	do			100		85
Do	do						50
Fish oil (see also specific name):							
Liver	Drum	None	10.0		463		50
Not cod-liver or halibut	Steel barrel	do					57
Do	Drum	do					51
Residue	do	do					56
Fish plates, iron	Package		.1		18		12
Fish scrap	Bag						72
Fixtures, bathroom	Wood box						246
Fixtures, electric. (See Electric fixtures.)							
Flashlight batteries. (See Batteries.)							
Flashlight cases	Corrugated fiber carton	Packing material	4.4	19	47	28	209
Flashlights	Wood box		15.8		212		168
Do	do						155
Flatirons. (See Irons, flat.)							
Flax:							
Fiber	Bale						90
Straw	Compressed bale	None					180
Tow	Bale		16.0		344		104
Do	do		25.0		341		164
Flaxseed	Cloth bag	None	5.0	2	142	140	80
Flies, dried	Bag	do	4.2		92		101
Flint, crushed	do	do	2.0		112		40
Flit	Wood box						81
Floor covering, felt-base	Bundle		5.6		229		55
Do	Roll		6.2		282		49
Do	do		5.1		244		47
Rolls	Cloth wrapping	None	13.5	30	483	450	62
Do	Fiberboard, cloth-wrapped	do	4.3	15	140	120	70
60 yd	do	do	6.3	32	272	240	51
Rugs	Cloth wrapping	do	.5	1	8	7	124
Do	Cloth	do	.5	1	7	6	140

9′ x 15′	Cloth wrapping	do	1.9	7	57	50	77
9′ x 12′	do	do	1.8	7	47	40	83
6′ x 9′	do	do	1.1	4	23	19	107
Flooring, tile (see also Tile)	Fiber carton		1.0		65		40
Florida water	Wood box	Bottles	1.1		28		90
Flotation reagents	Drum		10.7		283		84
Do	do		6.0		230		60
Do	do		10.7		250		96
Flour (see also specific name):							
Buckwheat	Wood barrel	None	6.7		217		65
Potato	Bag	do	6.0		223		60
Prepared	Fiber carton	12 pkgs., 2¾ lb. each	1.2	3	39	33	68
Do	Wood box	5 units, 12 1-lb. pkgs. each	2.6	16	78	60	75
Sago	Bag	None	3.9		152		58
Tapioca	do	do	6.0		219		61
Do	do	do					53
Wheat	Cloth bag	do	6.3	1	220	219	64
Do	do	do	5.5	1	196	195	62
Do	do	do	3.8	1	141	140	61
Do	do	do	2.8	1	99	98	64
Do	do	do	2.5		99		57
Do	do	do	3.3		140		52
Do	do	do	3.0		127		53
Do	Wood box	Packages	2.7		88		69
Flour-mill machinery:							
Bolter, flour, centrifugal reel	do	None	206.0		2,620		176
Duster, bran and shorts	do	do	192.0		1,620		164
Do	do	do	78.0		1,000		175
Level sifter:							
16 reductions	do	do	760.0		10,900		156
8 reductions	do	do	480.0		7,100		151
4 reductions	do	do	133.0		2,700		110
Mill, roller-feed:							
3 pair high	do	do	190.0		10,100		42
2 pair high	do	do	116.0		5,225		50
Do	do	do	56.0		2,800		45
Double	do	do	83.0		3,600		52
Mill, roller, wheat flour	do	do	705.0	2,700	14,300	11,600	110
Do	do	do	352.1	1,705	7,380	5,675	107
Packer:							
Barrel, friction, extra heavy	do	do	325.0		3,100		235
Barrel, friction, heavy	do	do	155.0		2,200		158
Sack, friction	do	do	110.0		1,600		154
Sack, bran and feed: friction, extra heavy	do	do	325.0		3,400		214
Sack, bran and feed: friction, heavy	do	do	155.0		2,300		149
Purifiers, middlings	do	do	207.0		2,500		187
Flour sifters	Wood crate	do					364
Flowers, artificial	Wood box						500
Flues. (See specific name.)							
Flux	Wood barrel						40

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Food-mixing machinery:							
Dough mixers:							
1,600-lb. capacity	Wood box on skid	None	670.8	2,300	19,600	17,300	77
800-lb. capacity	do	do	377.2	1,990	11,415	9,425	75
1-bbl. capacity	Wood box	do	147.5	410	4,200	3,790	80
Food mixers, commercial:							
80-qt. capacity	do	do	63.7	360	1,650	1,290	86
30-qt. capacity	do	do	42.9	340	1,150	810	83
Forges	Wood crate		18.0		335		120
Forgings, rough iron	Wood box		2.7		264		22
Do	Bundle		3.9		361		25
Forks:							
Carving	Wood box						164
Hay, 25 doz	do	None	29.0	120	800	680	83
1 doz	Bundle	do	4.1	2	38	36	249
Header, 1 doz	do	do	10.8	2	67	65	373
Manure, 20 doz	Wood box	do	39.4	166	952	786	93
12½ doz	do	do	30.3	118	646	528	107
1 doz	Bundle	do	8.8	2	48	46	373
Spading, 10 doz	Wood box	do	22.0	92	610	518	80
Stone, ½ doz	Bundle	do	3.8	2	48	46	172
Vegetable, 5 doz	Wood box	do	28.0	130	544	414	118
Formaldehyde	Wood barrel, pitch-lined	do	11.5	75	525	450	49
Do	do	do	13.9		533		58
Do	Wood box	Tins	3.1		60		115
Forms, papier-mâché	do						388
Forms, steel concrete	Wood crate						228
Foundry chaplets	Wood barrel						27
Foundry facing	Bag	None	2.0		102		50
Do	do	do					43
Foundry machinery:							
Jolter, plain, 4-in	Wood box	do	7.0	80	450	370	35
Jolt rollover	do	do	14.0	200	735	535	43
Jolt squeezer	do	do	54.0	590	1,550	960	78
Molding machine	do	do	94.0	535	2,300	1,765	92
Rollover, power, 26" x 30", 1,500-lb	Wood box on skid	do	261.0	1,540	10,900	9,360	54
Rollover, power, 20" x 24", 750-lb	do	do	102.0	1,050	4,350	3,300	53
Fountains, soda	Wood crate						110
Frames:							
Handbag	Fiber carton		1.0		42		75
Do	do		29.0		745		88
Metal	Wood box		72.0		1,340		120
Picture	do		11.7		176		134
Freon dichlorodifluoromethane	Cylinder		1.4		84		39
Do	do		2.7		150		39

Freon gas	do		3.7		215		39
Fruits (see also specific name):							
Candied	Wood box						82
Canned, mixed	do	6 cans, No. 10	1.0	7	53	42	43
Do	do	24 cans, No. 2, tall	.9	6	42	30	46
Do	do	48 cans, No. 1, tall	1.4	7	68	51	45
Do	do	72 cans, 8 oz. each	1.1	7	52	36	48
Canned, n. o. s.	Carton		.9		54		35
Dried, mixed	Wood drum	None	5.1	14	212	108	53
Do	Wood box	do	1.4	6	61	55	50
Do	Fiber carton	24 tiles, 1 lb. each	.5	3	27	24	41
Preserved (see also Preserves)	Wood box	Glass jars	1.3		52		56
Fuel oil	Drum	None	11.7	55	460	405	57
Fuller's earth	Bag	do	4.0		143		63
Funnels	Wood box		10.2		62		307
Fur:							
Hatter's	Bale		31.7		260		274
Raw	do	None	23.0		388		130
Do	do		16.3		290		125
Do	do		20.2		346		131
Do	do		19.6		287		154
Do	do		21.6		276		176
Waste, n. o. s.	do		5.4		68		179
Do	do		17.9		290		138
Furfural	Drum		18.5		232		179
Do	do		10.7		552		44
Do	Steel drum	None	11.0		502		49
Do	do	do	11.7	51	551	500	48
Furnace, n. o. s.	Wood crate		11.7	63	563	500	47
Furnaces, hot air, and parts	do		20.0		305		150
Furniture, dentists'	Wood box						66
Furniture, wooden	Wood crate		21.2		460		103
Fusel oil	Drum	None	11.2		163		156
Fuses (see also Electric fuses)	Wood box						66
Safety	do						80
Do	do		5.1		121		92
Fustic extract	Wood barrel	None	4.2		120		80
Do	Wood box		12.0		600		48
Garnet rock, crushed	Bag		.9		56		37
Do	do		.7		101		15
Do	do		1.1		101		18
Garters, cotton and silk	Wood box		1.0		101		22
Do	do		5.8		125		105
Gas, black (see also other gases)	Drum	None	27.7		421		147
Gas:							250
Fixtures	Wood box						
Logs	do						142
Mantles	do		9.0		172		117
Oil	Drum	None	21.1		216		219
Gaskets	Wood box		11.7	55	433	378	60
Do	do		23.0		388		40
			18.0		229		178

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Gaskets—Continued.							
Asbestos	Case		1.0		28		80
Do	Wood box		1.0		28		80
Drum-plug	Case		9.7		142		154
Steel and asbestos	do		7.5		129		131
Do	do		6.8		148		103
Gasoline	Steel drum	None	10.7	97	413	316	57
Do	Drum, 110-gal	do	23.3		820		64
Do	Steel barrel	do	11.0	93	427	334	58
Do	Drum, 55-gal	do	11.0	55	373	318	66
Do	Wood box	2 tins, 5 gal. each	1.6		80		51
Filters	Crate		10.9		305		80
Pumps and motors (see also Pumps)	Case		40.9		760		121
Gauge glasses	do		2.0		48		93
Gauges	do		.4		8		117
Do	Wood box		1.6		116		31
Iron	do		6.6		156		95
Gauze, cotton, bleached	Burlap roll	Paper lining	10.4	6	138	132	168
Gears:							
Metric	Wood box		2.5		138		39
Railway car draft	Loose						12
Spiral	Wood box		.3		24		31
Wooden	do		62.0		735		188
Gelatin	Drum		4.3		126		77
Do	Barrel		10.5		126		186
Do	Wood box		1.3		23		124
Edible	Wood barrel	Cloth liner	7.7	27	327	300	52
Do	Fiber carton	36 pkgs., 3¼ oz. each	.4	1	10	8	93
Ground	Bag		5.3		206		58
Do	do		11.5		205		126
Gelignite	Wood box		1.1		61		41
Do	do		1.2		62		45
Generators, electric. (See Electrical equipment.)							
Generators, gas-engine	Fiber carton		.2		1		448
Gin	Wood barrel	None	13.3		482		62
Do	Wood box	Bottles	1.0		43		52
Do	do	do	1.5		46		62
Ginger	Bag	None					89
Ginger ale	Wood box	48 bottles, 12 oz. each	2.1	12	98	40	48
Do	do	Bottles	4.5		176		56
Do	do	96 bottles, 6 oz. each	2.7	16	120	40	49
Girdles	do		10.4		119		196
Gherkins	do		.8		40		47

Glass:							
Cut	Wood barrel	None	9.2		92		224
Ground or broken	do	do					61
Laminated or safety	Wood box	Packing material	4.0	33	271	238	33
Do	do	do	8.0	59	490	431	37
Do	do	do	5.2	70	241	171	48
Do	do	do	13.4	136	796	660	38
Plate	do	do	8.0	51	415	364	43
Do	do	do	5.4	41	271	230	45
Do	do	do	19.8	400	1,200	800	37
Do	do	do	14.7	200	1,450	1,250	23
Rough-rolled, in sheets	do						56
Glass jars	Case		7.3		305		54
Do	do		7.2		278		58
Do	do		5.6		205		61
Do	do		7.8		282		62
Do	do		7.8		270		65
Do	do		6.0		205		66
Do	do		7.2		231		69
Do	do		5.2		168		82
Do	do		12.7		184		153
Do	do		9.7		122		178
Common glass, empty	Wood box						64
Glass tubing	Case		15.0		215		157
Do	do		14.4		186		174
Do	do		14.4		180		179
Glasses, drinking (see also Glassware, table)	Wood barrel	None	9.2		165		124
Glassware:							
Assorted	Wood crate	12 fiber cartons, 1 set each	20.1	46	298	192	151
Chemical	Corrugated fiber carton	Packing material	6.1	17	54	37	251
Do	do	Corrugated fiber carton	4.1	13	39	26	236
Do	do	do	5.6	15	32	17	393
Do	do	do	5.6	16	34	18	367
Lighting:							
Bowls, decorative, 11-in	Wood crate	8 cartons, 4 pieces each	19.7	47	183	104	241
Globes:							
Acorn, 8-in	do	2 cartons, 8 pieces each	16.0	44	88	34	407
Bathroom, 8-in	do	do	16.0	45	81	28	443
Crystal lobby, 9 7/16-in	do	8 cartons, 1 piece each	19.7	47	95	32	443
Cube, 6-in	do	4 cartons, 12 pieces each	25.0	64	236	156	237
Flat round, 10-in	do	3 cartons, 4 pieces each	13.0	44	98	45	297
Glass-inclosing	Fiber carton	12 separators	5.3	4	26	16	448
Do	do	4 separators	4.2	3	17	9	560
Hemisphere, 8-in	Wood crate	2 cartons, 16 pieces each	16.0	45	95	36	407
Hexagonal, 10 7/8-in	do	6 cartons, 1 piece each	13.0	44	104	36	280
Kitchen, 8½-in	do	2 cartons, 12 pieces each	16.0	44	94	29	381
Modernistic, 8-in	do	do	16.0	44	100	38	358
Office, plain, 8 7/16-in	do	4 cartons, 12 pieces each	25.0	64	152	72	368
Semidirect, 10-in	do	2 cartons, 4 pieces each	13.9	38	66	22	472
Stalactite, 4-in	do	4 cartons, 12 pieces each	14.1	51	103	44	307

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Glassware—Continued.							
Lighting—Continued.							
Panels, illuminating lamp:							
Convex, 19¼" x 14⅝" x 2⅛"	Fiber carton	Packing material, 1 piece	2.5	6	30	24	187
Straight, fluted, 7" x 16 13/16" x ¾"	Wood crate	6 cartons, 6 pieces each	17.5	34	226	168	174
Trough light, 6⅜" x 24½" x 1⅜"	Fiber carton	Packing material, 6 pieces	1.5	6	50	44	67
Plates, illuminating, 6½-in. flush	Wood crate	4 cartons, 24 pieces each	3.6	24	112	64	72
Shades:							
Astral, 4⅛-in	do	18 cartons, 12 pieces each	33.5	61	205	108	373
Bowl, porch, 7-in	do	8 cartons, 12 pieces each	29.8	70	214	112	308
Chandelier, 4¼-in	do	do	14.4	48	120	56	280
Half-shade, bathroom, 6-in	do	do	16.3	48	128	60	280
Semi-indirect, 6 7/16-in	do	do	21.9	55	143	48	308
Trough light, fluted, 18¾" x 6¾" x 4 7/16"	do	4 cartons, 2 pieces each	14.1	51	131	64	249
Table:							
Creamers	do	4 fiber cartons, 4 doz. each	9.3	38	134	68	155
Cups	do	do	9.0	24	108	68	187
4 doz	Corrugated fiber carton	Corrugated fiberboard	1.5	7	25	18	132
6 doz	do	do	2.0	7.5	30	22.5	149
Desserts, 6-in	Wood crate	6 fiber cartons, 4 doz. each	9.1	30	138	96	149
Plates:							
2 doz	Corrugated fiber carton	Corrugated fiberboard	.9	5	29	24	70
Do	do	do	.8	5	25	20	72
Bread and butter, 6-in	Wood crate	4 cartons, 4 doz. each	3.0	16	92	60	72
Dinner, 9¼-in	do	2 cartons, 2 doz. each	3.3	32	80	42	93
Salad, 8-in	do	6 cartons, 4 doz. each	9.1	58	238	138	86
Platters, oval, 13-in	do	12 cartons, 1 doz. each	15.8	28	316	240	112
Saucers	do	4 cartons, 4 doz. each	3.9	24	96	54	90
4 doz	Corrugated fiber carton	Corrugated fiberboard	.6	3	19	16	70
6 doz	do	do	.7	5	28	23	56
Sherbets	Wood crate	4 cartons, 4 doz. each	8.5	34	110	60	172
Soup cups	do	do	8.1	37	125	80	149
Sugars	do	do	9.3	38	134	80	160
Tumblers:							
9-oz., 12 doz	Corrugated fiber carton	Corrugated fiberboard	3.5	11	58	47	135
Bell-shape, 12-oz	Wood crate	4 cartons, 6 doz. each	11.7	86	198	66	132
5-oz	do	do	8.4	30	102	41	187
Glass, common	Wood barrel	None	9.0		308		65
Old-fashioned cocktail	Wood crate	2 cartons, 6 doz. each	8.0	29	111	72	160
Straight-side	do	4 cartons, 6 doz. each	15.1	52	188	112	187
Do	do	2 cartons, 12 doz. each	7.6	51	111	52	149
N. o. s	Carton		2.0		27		166
Do	Case		7.3		162		101
Do	Barrel		8.4		125		151
Do	do		9.7		90		210

Do.	do.		9.2		125		164
Do.	do.		10.0		78		287
Globes for common lanterns.	Wood box.		5.5		60		205
Gloves:							
Cotton.	Case.		45.2		735		138
Do.	do.		26.9		424		142
Do.	do.		41.9		418		225
Knit.	Wood box.		18.6		190		219
Workingmen's, 50 doz.	Fiber carton.	None.	10.3	13	140	127	165
Workingmen's, 93 doz.	Wood box.	do.	28.1	94	384	290	163
Leather.	Bale.		4.6		122		84
Do.	Case.		33.0		405		182
Rubber.	Fiber carton.		5.0		40		336
Do.	do.		1.0		14		160
Do.	Wood box.		4.1		59		156
Silk.	do.		16.8		214		180
Surgical.	do.						90
Woolen.	Bale.		3.7		36		233
Glucose.	Barrel.		13.7		757		40
Do.	Wood barrel, 50-gal.	None.	13.7	60	760	700	41
Do.	Wood box.	Tin boxes.	.9	11	47	36	43
Do.	Solid fiber carton.	do.	.7	6	42	36	37
Do.	Wood barrel.	None.	14.2	58	730	672	44
Do.	do.	do.					41
Glue:							
Animal	do.	Paper liner.	10.9	35	410	375	59
Do.	Cloth bag.	do	6.3	3	308	305	45
Do.	Wood barrel.	do.	6.4	23	253	230	56
Do.	Cloth bag	do.	4.0	2	202	200	44
Dry.	Barrel.		10.5		489		48
Do.	do.		9.2		328		63
Do.	do.		10.5		323		73
Do.	Bag.		5.4		103		118
Liquid.	Barrel.		13.7		610		50
Do.	do.		13.7		601		51
Do.	do.		9.2		303		68
Vegetable.	Cloth bag.	Paper liner.	3.8	1	152	151	56
Do.	do.	do.	2.6	2	102	100	57
Glue preservative.	Drum.	None.	5.0		149		75
Gluten feed.	Bag.	do.					67
Do.	Burlap bag.	do.	3.5	1	101	100	77
Do.	do.	do.					64
Glutrin.	Wood barrel.	do.					42
Glycerin.	Wood box.		1.3		61		47
Do.	Steel drum.	None.	11.7	105	680	575	39
Do.	do.	do.	22.8		1,300		42
Glycol (see also specific name)	Drum.	do.	12.0		577		45
Glycothymoline.	Carton.		1.0		30		75
Do.	do.		.8		25		75
Goatskins.	Bale.		6.1		200		68
Do.	do.		30.0		638		105
Do.	do.		14.1		250		126
Do.	do.		11.9		150		178

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Goggles, sun	Wood box		19.8		282		157
Do	do		7.4		84		197
Goldbeater skins	Wood tierce						43
Gooseberries, canned	Wood box	24 cans, No. 10	1.2	9	52	39	52
Do	do	24 cans, No. 3	1.6	11	70	53	51
Do	do	24 cans, No. 2	1.0	8	43	30	52
Grain, brewers', dried	Bag	None					143
Granite, dressed blocks	Pieces						16
Granite, rough	do						14
Grapefruit:							
Canned	Wood box	6 cans, No. 10	1.2	9	52	39	52
Do	do	24 cans, No. 2, tall	1.0	4	39	30	56
Do	Fiber carton						60
Do	Case		.7		36		47
Do	do		.8		42		47
Do	do		1.1		50		49
Do	do		.6		27		50
Fresh	Wood box	None	2.3	6	85	79	62
Do	do	do	.7		80		75
Juice	do	6 cans, No. 10	.2	9	49	36	55
Do	do	24 cans, No. 2	1.0	8	40	27	56
Grapenuts	do	Packages	1.0		22		102
Do	Fiber carton	do	1.0		21		80
Grapes:							
Fresh	Keg		2.3		55		92
Do	Lug		1.0		34		65
Do	Wood box	Packing material	1.0		34		62
Do	Chest		1.7		55		68
Juice	Wood box	12 bottles, 32 oz. each	1.6	10	54	27	66
Do	do	24 bottles, 16 oz. each	1.7	11	60	28	66
Quarts	do	Bottles	1.2		60		45
Pints	do	do	1.4		60		56
Grape sugar	Wood barrel	None					45
Graphite	Bag		2.2		103		45
Do	do		2.6		127		46
Do	do		2.4		103		52
Do	do		2.5		102		55
Do	do		2.4		103		67
Do	do		2.6		103		71
Do	Barrel		11.0		462		53
Do	do		13.7		570		54
Do	do		11.7		443		59
Do	do		12.9		460		63
Amorphous	Wood barrel	None	14.7	70	470	400	70
Do	do	do	6.6	21	221	200	68

Do	Wood keg	do	3.2	16	116	100	62
Do	Wood box	do	1.8	11	68	50	61
Do	Steel drum	do	1.6	7	57	50	62
Do	Steel bucket	do	.8	4	29	25	64
Do	Wood box	36 cans	1.9	12	57	36	75
Crystalline	Wood barrel	None	14.7	70	470	400	70
Do	do	do	6.6	21	221	200	68
Do	Wood keg	do	3.2	16	116	100	62
Do	Steel drum	do	1.6	7	57	50	62
Do	Steel pail	do	.8	4	29	25	64
Do	Wood box	5 cans	1.8	11	68	50	61
Do	do	36 cans	1.9	12	57	36	75
Flakes (see also Powder)	Wood barrel	None	14.7	70	470	400	70
Do	do	do	6.6	21	221	200	68
Do	Wood keg	do	3.2	16	116	100	62
Do	Steel drum	do	1.6	7	57	50	62
Do	Steel pail	do	.8	4	29	25	64
Do	Wood box	5 cans	1.8	11	68	50	61
Do	do	36 fiber cartons	1.3	9	50	36	56
Grease	Wood barrel	None					64
Powder	Bag	do					60
Do	Wood barrel	do					67
Do	Drum	do					65
Grass hooks	Wood box	6 cartons, 1 doz. each	1.1	13	67	47	37
Grate bars (each)			.3		46		12
Grease:							
Lubricating	Barrel		11.9		452		59
Do	do		12.7		462		61
Do	do		13.7		456		67
Do	do		13.7		477		64
Do	Drum		11.7		455		57
Do	Half barrel		8.3		261		71
Do	Cartridge		3.2		116		61
Do	Case		1.6		67		53
Do	do		1.3		70		43
Do	do		1.8		38		59
Do	Drum		10.7		480		50
Do	Metal drum	None	11.7	58	466	408	56
Do	Metal half drum	do	6.9	32	250	218	62
Do	Metal keg	do	2.6	10	110	100	53
Do	Wood keg	do	3.7	17	117	100	71
Do	Wood barrel	do	14.1	79	460	381	69
Do	Wood half barrel	do	7.7	31	282	251	61
Do	Wood crate	Metal pail, 25-lb.	1.1	10	35	25	70
Do	Wood box	12 cans, 1 lb. each	.5	6	18	12	62
Do	do	6 cans, 5 lb. each	1.1	11	41	30	60
Do	do	36 cans, 1 lb. each	1.4	17	53	36	59
Do	Steel drum	None	12.1	51	451	400	61
Do	do	do	6.0	28	253	225	52
Do	do	do	2.8	16	116	100	55
Do	Wood box	24 cans, 1 lb. each	.9	5	35	24	59

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Grease—Continued.							
Petroleum	Wood barrel	None	14.0		471		65
Do	do	do	13.0		471		62
Vegetable	do	do					60
Wool	Steel drum	do	10.3	62	462	400	50
Do	Wood barrel	do	12.8	71	444	373	64
Grease guns, lubricating	Case		5.0		190		59
Do	do		4.4		166		60
Grease pumps	Wood box		9.0		220		92
Grinders, feed or knife	do						68
Grinding balls. (See Steel and iron.)							
Grindstones	Wood barrel		9.0		411		49
Do	Wood crate		3.4		250		30
Grits. (See Hominy.)							
Grits, brewers'	Bag	None	3.3		140		52
Gum:							
Alibanum	do	do	3.7		160		71
Arabic	do	do					49
Copal	do	do					92
Elemi	do						49
Powder	Wood box		.8		27		66
Do	do		.7		28		56
Resins. (See Resin, natural.)							
Synthetic	Case		5.3		213		57
Do	do		5.0		179		62
Do	do		5.3		181		66
Do	do		5.7		147		86
Do	do		6.4		147		98
Tragacanth	do		11.5		228		113
Do	do						84
Do	Bag	None					97
Gum drops	Barrel		8.7		334		58
Do	do		9.2		315		65
Do	Wood box						60
Guncotton, wet	do		1.3		52		54
Gunnysacks	Pressed		20.5		500		92
Gutta percha	Wood barrel	None	10.0		262		82
Compound	Barrel		10.5		296		80
Do	do		9.7		260		83
Do	do		11.3		307		83
Do	do		11.3		295		86
Do	do		10.0		255		88
Gypsum	Pieces						43

Hair:							
Cattle	Bale		27.0		448		137
Do	do		29.0		444		146
Do	do		21.0		314		149
Do	do		21.0		311		150
Do	do		31.0		439		154
Do	do		25.0		342		164
Do	do		30.0		343		198
Do	do		51.0		525		216
Felt	Crate		11.3		100		252
Do	do		15.6		135		258
Do	do		16.0		134		266
Do	do		12.0		95		285
Do	Bale		11.0		92		268
Do	do		17.0		132		288
Do	do		47.0		314		336
Hog	do		33.0		468		157
Do	do		28.7		388		165
Do	do		28.3		383		166
Do	do		27.3		351		174
Do	do		10.7		121		195
Do	do		36.8		393		210
Do	do		31.3		292		240
Do	do		38.0		350		243
Do	do		51.0		366		312
Horse	do		20.0		503		89
Do	Woodbox						65
Human	Bale	None					199
N. o. s.	do	do	41.0		513		177
N. o. s.	do	do	32.0		292		243
Hair clippers. (See Clippers.)							
Hairdressing supplies	Case		29.5		348		190
Hair lotion	Carton		1.1		38		64
Do	do		2.4		82		66
Brilliantine	Wood box		4.1		136		67
Hake	Drum	None	4.2		138		67
Hammers	Wood box		3.0		154		50
Do	do		6.0		268		47
Hand	do	Wax paper liner	5.5	25	250	225	49
Machinists'	do		8.7		390		48
Riveting	do		3.7		180		46
Hammocks	Bale	None	20.0		200		224
Hampers, fruit, empty bushel, with covers in nested bundles.	Loose						520
Hampers, returned empty, n. o. s							310
Hams:							
Canned	Fiber carton	Tins	1.0		12		62
Cured	Plywood box	Paper liner	13.5	47	700	653	43
Do	Wood box	None	11.0	60	660	600	37
Dry-salt	Plywood box	Paper liner	16.2	50.5	[1] 790	675	46
Pickled cured picnic	do	do	12.6	43	650	600	43

[1] Including salt.

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Hams—Continued.							
Smoked, Puerto Rico style, picnic	Slack barrel	Canvas, paper, and glassine	8.6	23	260	230	74
Sweet pickled cured	Plywood box	Paper lining	14.6	47	700	650	47
N. o. s	Wood box		13.0		580		51
N. o. s	do		6.2		265		52
N. o. s	do		7.0		297		52
Hams and shoulders	do	None	12.8	55	655	600	44
Do	do	do	12.4	55	655	600	43
Do	Slack barrel	Glassine, burlap	12.4	48	448	400	62
Do	do	do	10.9	30	230	200	106
Do	Solid fiber carton	do	2.8	8.5	108.5	100	58
Do	do	do	1.4	5	55	50	57
Do	do	do	2.8	9	119	110	53
Handbags	Fiber carton		1.0		42		75
Do	Case		38.3		357		240
Imitation leather	do		19.3		163		264
Handkerchiefs, cotton	Wood box	Cardboard box	25.7	105	250	145	87
Handles:							
Adze	Fiberboard carton	None	1.6	2	42	40	85
Do	Wood box	do	5.1	40	140	100	81
Axe	Burlap bundle	do	4.4	2	107	105	92
Do	Fiberboard carton	do	1.4	2	35	33	90
Do	Wood box	do	4.6	40	140	100	74
Do	do	do	9.7	50	212	162	102
Do	Fiberboard carton	do	1.3	2	31	29	94
Do	Wood box	do	4.2	40	122	82	77
Hammer	Burlap bundle	do	.9	2	38	36	53
Do	Wood box	do	2.8	25	95	70	66
Hatchet	Burlap bundle	do	2.4	2	102	100	53
Railroad pick	do	do	5.1	2	147	145	78
Do	Wood box	do	8.1	57	232	175	78
Sledge hammer	Burlap bundles	do	4.9	2	140	138	78
Do	Wood box	do	4.0	40	142	102	63
Umbrella, unfinished	do						58
Wood, n. o. s	Bundle	None	1.0		34		90
Hangers, coat, wood	Wood box		6.0		65		207
Hangers, clothes							86
Hardware:							
Iron, N. O. I. B. N	Wood box	Wax paper liner	2.8	14	170	156	37
N. o. s	do		2.6		112		52
Do	do		2.0		161		25
Do	Package		3.0		142		50
Do	Wood box		4.1		144		64
Do	do		5.6		91		138
Harness, leather	Corrugated fiber carton	None	4.2	6	50	44	188

Harrow disks and plows. (See Agricultural machinery.)							
Hats:							
Felt	Wood box		27.0		145		417
Fiber	Fiber carton		2.1		6		776
N. o. s.	Wood box		15.2		80		400
Straw	do		23.4		147		357
Do	do		9.3		180		115
Hay	Bale	None					120/160
Hay press:							
Main frame	1 crate		89.2		2,500		81
Trimmings	1 case		9.3		836		24
Power bed	1 bundle		11.3		469		53
Cross head	1 case		9.8		253		87
Wood sweep	1 piece		1.5		55		60
Wheels	4 loose		{14.7 / 3.7 each		{325 / 81 each		101
Total			135.7		4,438		69
Haystellite inserts	Case		1.1		145		17
Heater, knocked-down (tar or asphalt)	do		1,139.5		12,480		207
Heat-regulating equipment	do		15.8		255		139
Heel plates, iron (for shoes)	Wood box		1.1		71		34
Heels, rubber. (See Rubber heels.)							
Helium gas	Cylinder						70
Hematin crystals	Wood barrel	None					59
Hematite crystals	do	do	12.0		370		72
Hemlock extract	do	do	13.0		648		45
Do	do	do	9.9		583		37
Hemp (see also specific name):							
California	Bale	do	29.0		300		215
Fiber	do	do					140
Tow	do	do					168
Herrings	Wood crate		6.8		196		78
Do	Kit		7.0		180		86
Hides	Pieces		1.3		21		143
Calfskin, wet, salted	Bundles		1.9		98		44
Cattle, horse, or sheep, green, salted	do						45
Dry	Piece		.7		24		71
Do	do		1.3		25		117
Do	Bale		4.9		128		86
Wet, salted	Bundle		4.5		142		71
Do	do		1.0		69		33
Hide trimmings, green, salted	Bale	None					37
Hinges	Wood box		3.0		270		25
Spring	do		2.1		186		25
Steel	do		1.1		52		47
Hoes, garden:							
15 doz	do	None	18.1	94	489	395	83
1 doz	Bundle	do	3.3	2	29	27	249
Hoist:							
Air	Wood box	do	10.3	102	542	440	43
Do	do	do	7.4	67	392	325	42
Electric, high-speed, 1,200-lb	do	do	210.0	335	1,535	1,200	306
Electric, 1-ton, plain trolley	do	do	46.0	140	590	450	175

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Holders:							
Cigarette	Wood box		18.4		292		141
Mop	do						83
Paper	do		12.5		140		195
Hominy	Bag	None	3.3		140		52
Feed	do	do					74
Do	do	do	5.0		165		67
Grits	Wood box	24 tin cans	1.4	21	69	48	51
Honey	do		1.0		69		33
Do	Wood barrel	None					44
Do	Wood box	Tins	2.2		137		35
Do	do	Glass jars	1.5		50		68
In the comb	do						80
Hoofs, cattle	Bale	None					336
Hooks, curtain	Wood box		6.0		307		42
Hoops, bentwood trunk	Bale	None					229
Hops	do	do	22.0		200		240
Do	Compressed bale	do					95
Do	Uncompressed bale	do					195
Do	Wood box		58.5		626		209
Do	do		61.9		715		200
Double-press	Bale	None	22.5		400		130
Horns:							
Amplifying	Wood box						643
Cattle	Bag	None					104
Shavings of	Bale	do					276
Horse clippers. (See Clippers.)							
Horse collars, leather	Corrugated fiber carton	do	7.2	5	50	45	324
Horsehair. (See hair.)							
Horse nails. (See Nails.)							
Horseshoes	Wood keg	do	1.3	7	107	100	27
Hose:							
Fire	Fiber carton		2.0		51		88
Linen	Cloth bale	None	8.8	10	266	256	75
Do	do	do	7.0	10	222	212	70
Do	do	do	5.4	10	174	164	70
Linen, 2½-in., 50 ft.	Wood box	do	3.2	7	62	55	112
Rubber	do	Paper	29.6	97	763	666	87
Garden, rubber	Cloth bag	Paper-wrapped	5.0	3	166	162	68
Do	Burlap bale	Paper	3.5	3	74	71	106
¾-in., 100 ft	Bale	None	2.4	1	38	37	140
Industrial:							
Air-brake, 1⅜-in., 25 pieces, 22 in. long	Fiber carton	do	1.6	4	50	46	70
Gasoline, 1½-in., 100 ft	Wood box	do	15.0	76	230	154	149
Oil-suction, 6-in., 20 ft	do	do	25.3	132	470	338	118

Pneumatic-tool, ½-in., 100 ft	Bale	do	1.8	2	29	27	140
Water-suction, 4-in., 20 ft	Wood box	do	17.7	86	174	88	224
Welding, 1-in., 100 ft	Bale	do	7.8	5	125	120	140
Mill, rubber	Wood box	Paper	29.6	90	668	572	100
Mill, 2½-in., 50 ft	do	None	3.2	6	54	48	132
Radiator, rubber	Corrugated fiber carton	do	.4	1	11	10	81
Rubber	Bale	do	3.8		121		71
Do	do	do	4.1		129		73
Do	do	do	6.9		190		83
Do	do	do	8.0		188		95
Do	do	do	6.0		132		102
Do	do	do	6.3		132		108
Do	do	do	6.0		116		117
Do	do	do	5.0		92		121
Do	do		5.0		160		70
Do	Case		30.6		553		124
Do	Bale		1.5		25		134
Do	do		5.1		78		148
Do	do	None	9.6		179		120
Do	Case		20.0		470		97
Do	do		25.0		576		97
Do	do		10.0		291		80
Do	do		20.0		510		90
Do	do		18.0		571		72
Do	do		21.0		610		80
Do	Box		31.0		626		112
Do	Case		31.0		622		110
Water, rubber	Burlap bale	Paper	13.0	9	266	257	109
Water, 2½-in., 100 ft	Bale	None	7.0	5	113	108	140
Welding, rubber	Burlap bale	Paper	2.1	2	47	45	100
Hose and couplings	Case		35.2		290		271
Hose couplings, gasoline	do		3.3		154		48
Hosiery:							
Cotton	do		12.7		258		110
Do	do		16.0		268		133
Cotton, assorted, children's	Wood box	25 boxes, 4 doz. each	12.0	90	180	65	149
Cotton, men's	do	100 boxes, 1 doz. each	14.0	43	158	100	204
Cotton and silk, men's, women's, children's	do	Cardboard boxes	6.9	56	80	24	193
Do	do	do	18.6	148	230	82	181
Do	do	do	30.1	285	435	150	186
Do	Fiberboard cartons	do	.4	2.6	4	1.4	224
Do	do	do	1.4	8.4	14	5.6	224
Do	do	do	2.0	13	22	9	204
Silk, women's	Wood box	3 boxes, 240 doz	32.1	141	460	124	160
N. o. s	Case		19.0		220		194
Do	do		6.9		88		176
Do	do		2.3		32		158
Do	do		9.5		132		162
Hubs, wagon, wooden	Wood box						86
Huskers, corn	do						113
Hydrogen	Cylinder		3.3		123		59

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Hydrogen peroxide	Aluminum drum, 30-gal	None	5.3	32	282	250	42
Do	Carboy, 13-gal	do	4.7	70	190	120	56
Do	Wood box	Bottles	1.7		55		71
Do	Wood barrel	None	12.0		469		57
Ice chests. (See Chests.)							
Ice cream:							
Cans. (See Cans.)							
Cones. (See Cones.)							
Freezers	Wood box		8.5		145		130
Do	do		25.3		400		140
Commercial:							
2-tube, continuous	do	None	164.0	800	3,400	2,600	108
150-gal., continuous	do	do	143.5	1,310	3,525	2,215	91
60-gal., continuous	do	do	101.8	850	2,365	1,515	96
40-qt., with control	do	do	88.7	850	2,310	1,460	86
Incubators, brooders, and parts	Wood crate	do					218
Indigo	Wood box						61
Paste	Wood barrel, 20-gal	None	6.0	50	183	133	72
Infusorial earth	Bag	do	5.3		80		149
Do	do	do	7.0		100		157
Do	do	do	8.0		104		165
Do	do	do	3.5		152		52
Ink	Steel drum	do	11.5	110	550	440	47
Do	Wood box	20 cans, 5 lb. each	3.0	23	140	100	49
Newspaper-printing	Drum	None					56
Do	do	do	10.7		105		48
Printing	do		11.7		576		45
Writing	Case		3.7		143		59
Ink eradicator	Wood box		2.4		50		108
Ink pads	do		16.5		515		72
Inkstands	do		4.5		148		62
Do	do		9.0		100		181
Insecticide:							
Agricultural	Barrel		8.2		199		91
Do	do		9.7		200		108
Do	Carton		1.3		54		52
Do	Drum		2.1		79		59
Household	Case		1.5		65		52
Do	do		1.7		68		55
Liquid	Wood box	12 cans, 1 gal. each	3.0	18	117	88	57
Do	do	24 cans, 1 qt. each	1.9	12	62	42	66
Instruments, measuring	do		24.0		213		255

Insulation (see also Boards):							
Cork:							
Building board	Wood crate	None	13.5	25	130	100	224
Do	do	do	21.4	30	115	85	448
Pipe-covering	do	do	9.8	17	100	83	224
Refrigeration, coated-board	Wood box	do	16.9	27	170	143	224
Hair felt	Roll						275
Insulators	Fiber carton		1.0		69		45
Do	do		1.0		71		45
Porcelain or glass	Wood crate						75
Iron. (See Steel and Iron.)							
Iron ore. (See Ore.)							
Iron oxide	Drum	None	2.7		227		26
Do	Barrel		10.0		220		102
Do	do		9.3		200		104
Do	do		8.9		185		108
Not spent	Wood barrel	None					89
Do	Drum	do					95
Synthetic	Wood barrel	Paper liner	11.5	27	327	300	77
Do	do	do	11.5	27	177	150	149
Irons:							
Flat	Fiber carton		1.9		86		50
Flat, electric, ½ doz	do	6 cartons, 1 each	1.0	3	43	37	53
Sad	Wood barrel	None	6.0		725		18
Isinglass (see also Mica)	Wood box						90
Isopropyl acetate	Steel drum, ICC-5E		11.7	52	432	380	60
Istle or ixtle	Bale	None	11.9		278		96
Do	do	do	13.7		289		106
Do	do	do	13.3		274		108
Do	do	do	14.9		298		112
Do	do	do	17.0		315		121
Do	do	do	14.0		351		90
Istle waste	do	do					224
Ivory nuts	Bag	do	4.4		220		45
Do	do	do	4.0		150		60
Do	do	do					67
Ivory waste and scrap	do	do					112
Jacks:							
Automobile	Wood box		4.1		225		41
Do	do		1.7		325		12
Bumper	do		9.9		587		38
Hydraulic	do		6.2		434		32
Jam	do		1.3		60		50
Do	do	6 cans, No. 10	1.2	9	61	48	44
Do	do	24 cans, No. 3	1.6	11	79	62	46
Do	do	24 cans, No. 2	1.0	8	49	36	46
Jellies	Fiber carton	24 jars, 8 oz. each	.5	2	26	12	46
Do	Pail	None	.8		33		65
Jewelry	Wood box		2.3		74		70
Electroplated	do		1.5		20		168
Jugs, food, earthenware	Fiber carton						118
Jute cuttings	Bale	None					58

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Kapok	Bale	None	21.3		255		188
Do	do	do	16.9		220		172
Kapok life preservers	Wood box		7.0		52		302
Kauri gum. (See Resin, natural.)							
Kerosene	do	Tins	2.0		80		56
Do	Steel drum	None	10.7	64	380	316	64
Do	Steel barrel	do	11.0	93	450	357	46
Ketchup. (See Catchup.)							
Khaki, cotton	Wood box		43.7		1,087		90
Kid, glazed	Case		13.3		291		102
Do	do		10.1		213		106
Do	do		12.0		256		105
Kidneys:							
Frozen	Wire-bound box	None	.4	2	22	20	41
Do	Wire-bound box, paraffined partition.	do	1.3	6	56	50	52
Do	Wire-bound crate	6 tin pails, 10 lb. each	2.0	10	70	60	64
Hog	Solid fiber carton	None	.7	2	22	20	72
Kieselguhr. (See Infusorial earth.)							
Kits, wooden, empty	Loose						495
Kleenex. (See Paper.)							
Knit goods, artificial silk, cotton, wool	Roll						224
Knitting machinery	Case		17.7		444		89
Do	do		14.4		428		75
Do	do		20.7		618		75
Knives, kitchen	Wood box		3.7		85		90
Kodascope reels	Case		3.8		130		66
Do	do		2.7		86		69
Kotex. (See Sanitary pads.)							
Krumbled bran	Fiber carton						176
Krumbles	Wood box						131
Labels, paper	do						52
Lacquer	Drum		1.1		47		52
Do	Pail, 5-gal		1.2		47		55
Do	Case, 12-gal		2.8		123		52
Do	Case, 5-gal		1.1		60		41
Do	Case, 24-qt		1.8		68		60
Do	Case, 12-qt		.9		36		57
Clear	Drum		10.7		444		54
White	Wood box	6 cans, 1 gal. each	1.8	12	72	55	56
Do	do	24 cans, 1 qt. each	1.9	12	73	53	56
Lacquer paste, black	Pail		1.1		51		48
Lacquer paste, white	do		1.1		60		41

Lacquer thinner	Drum		11.7		407		64
Do	do		11.7		398		65
Do	Kit		1.2		40		65
Do	Case		3.0		125		54
Ladles	Wood box		36.7		860		97
Lamp:							
Chimneys. (See Chimneys.)							
Parts	do		8.0		131		133
Shades	do		5.9		40		331
Glass (see also Glassware)	Case		7.0		55		285
Paper	Fiber carton						693
Do	Wood box						411
Wicks	do		1.0		22		102
Lampblack (see also Colors in oil)	Fiber carton		4.3		50		188
Lamps:							
Arc, electric	Wood box		8.7		90		220
Automobile	do		15.8		157		226
Do	do		6.0		100		134
Flashlight, 25-volt	do	Fiber cartons	3.8	12	47	22	187
Incandescent	Cartons		1.1		4		606
Do	Cases		8.0		60		298
Do	do		10.0		105		403
Do	Crates		12.0		105		256
25- and 60-watt	Fiber carton	Fiber wrappers	3.0	2	14	10	448
Do	do	do	2.3	2	12	8	448
Land leveler	1 piece		17.9		210		192
	do		31.3		520		134
	1 case		8.4		325		58
Total			57.6		1,055		122
Lanoline	Wood box		4.5		145		69
Lanterns	Case		2.7		33		187
Do	Carton		2.7		29		206
Do	do		2.6		28		213
Do	do		2.4		24		219
Do	do		2.7		27		228
Do	do		2.3		22		231
Do	do		2.7		26		237
Do	do		2.0		18		249
Do	Wood box		5.4		90		134
Lard (see also Shortening)	Wood tub	None	1.7	7	64	57	59
Do	Wood box	do	1.4	7	63	56	50
Do	Oblong tin can	do	.7	2	39	37	40
Do	Round tin drum	do	2.8	5.5	100.5	95	62
Do	Solid fiber box	30 cartons, 1 lb. each, and liners	.7	3	33	30	48
Do	Wood box	6 tin pails, 8 lb. each	2.2	16	64	48	102
Do	Metal drum	None	10.7	60	470	410	51
Do	Wood box	12 tin pails, 4 lb. each	2.1	18	66	48	71
Do	Tierce		13.7		449		68
Do	do		14.0		445		71
Do	Box		1.7		63		62
Do	do		1.3		62		48
Do	do		1.4		62		50
Do	Pail		1.3		33		85

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Lard (see also Shortening)—Continued.	Wood tierce	None	12.1	70	470	400	57
Do	Fiber carton, cloth liner	30 cartons, 1 lb. each	.7	1	33	30	50
Neutral	Wood tierce	None	12.9	68	438	370	66
Pure	Wood box	Paper lining	1.3	6.5	62.5	56	47
Lard substitute	Metal drum, 55-gal	None	12.0	57	500	443	54
Do	Corrugated fiber carton	Tins	.9	5	35	30	57
Do	Wood box	do	2.4	....	79	....	69
Latches	do	150 boxes	4.5	28	287	235	35
Do	do	100 boxes	2.7	24	164	140	36
Lath:							
Metal	Bundle	None	3.4	....	96	....	79
Do	Roll	do	7.5	....	281	....	59
Steel	Bundle	do	2.3	....	70	....	72
Lathe. (See specific name.)							
Laundry machinery, commercial:							
Drying tumbler, 42" x 60"	Wood box	do	520.0	2,120	6,950	4,830	149
Extractor, 30-in. underdrive	do	do	125.0	405	2,270	1,865	97
Ironer	do	do	63.0	445	1,460	1,015	97
Ironers, 100-in	3 wood boxes	do	59.6	315	9,615	9,300	14
Do	Wood box	do	243.0	1,450	4,250	2,800	118
Presser	do	do	102.0	504	1,530	1,026	149
Washers:							
36" x 48"	do	do	316.3	225	5,325	5,100	132
42" x 54"	do	do	229.0	1,000	4,800	3,800	124
32" x 54"	do	do	177.1	235	2,235	2,000	172
36" x 24"	do	do	99.2	145	1,295	1,150	172
24" x 36"	do	do	76.0	490	1,210	720	149
Lavatory:							
Cast iron slab apron with pedestal:							
Slab	Wood crate	do	3.9	31	106	75	90
Pedestal	do	do	3.9	16	69	50	138
Cast iron wall	do	do	5.2	36	98	62	119
(2)	do	do	7.9	72	196	124	90
Enameled, iron, 20" x 18"	2 wood crates	Packing material	6.7	39	159	120	93
Enameled (2)	2 wire-bound crates, bundled	do	6.3	25	123	98	115
Vitreous	Wood crate	None	7.5	46	120	74	140
Vitreous china pedestal	2 wire-bound crates, bundled	do	6.2	18	101	83	137
Vitreous caina wall	do	do	4.1	11	60	49	155
Lawn mowers. (See Mowers, lawn.)							
Lawn sprinklers	Wood box	....	.7	....	14	....	120
Lead:							
Bars, billets	Loose	....	....	....	....	....	8
Black	Wood barrel	None	12.0	....	470	....	58
Dross	Bag	do	1.0	....	187	....	12
Foil	Wood box	....	....	....	....	....	20

Ingots	Loose						8
Nitrate	Wood barrel	Paper liner	4.8	18	418	400	26
Pig	Loose		.5		100		11
3″ x 5″ x 30″	do		.3		103		6
Red	Wood keg	None	1.0		105		23
Dry	Wood barrel	do					32
Refined	Bar		.5		102		11
Residue	Bag	None					15
Do	Drum	do					25
Sheet	Roll	do	11.6		3,563		7
White	Wood barrel	do	5.4		510		24
Do	Wood keg	do	.4		40		22
Do	Cask		11.9		1,080		25
Leadite	Wood barrel	None	7.0		375		42
Leather:							
Artificial	Wood box						70
Do	Wood crate		7.1		300		53
Do	do		14.3		578		56
Do	do		10.0		310		72
Do	do		7.3		221		74
Do	do		20.6		785		76
Do	do		28.2		828		76
Finished	Wood box		6.0		118		113
Do	do		12.1		229		118
Sole	Bag	None	5.6		298		89
Do	Bale	do	9.0		304		65
Sole, bends	do	do	7.1	1	257	256	62
Upholstery	Wood box	do	15.2	85	371	286	92
Upper	Wire-bound box	Oiled paper	16.6	62	370	308	101
Do	Bale	Chicken wire paper	12.3	11	236	225	117
N. o. s.	Wood box		16.3		430		85
Do	do		10.2		320		70
Do	do		11.8		335		79
Do	do		11.3		299		85
Do	do		12.1		311		87
Do	do		11.1		279		89
Do	do		9.7		235		93
Do	do		23.7		559		95
Do	do		25.4		560		102
Do	do		13.1		246		119
Leather bellies	Roped bale	None	10.5	1	240	239	98
Leatherboard (see also Leather, artificial)	Bundle	do	2.5		124		45
Do	do	do	3.0		151		45
Leather scrap (see also Scrap leather)	Bale	do	15.6		316		110
Do	do	do	18.3		364		111
Do	do	do	6.7		201		74
Do	do	do	8.7		252		77
Do	Sack	do	2.4		39		139
Do	Bundle	do	4.0		94		93
Leather sole and belting offal	do	do	10.0	6	306	300	73
Do	Bag	do	5.9	2	180	178	73
Do	do	do	7.6	2	152	150	112

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Leather soles:							
Inner	Double bag	None	5.0	4	270	266	42
Outer, cut	do	do	5.2	6	268	262	44
Leather strips	Bale	do	5.0		191		59
Leather welting	Wood box						128
Leaves, n. o. s	Bale		40.1		764		114
Do	do	None					46
Lecithin	Drum		2.4		113		48
Do	do		2.7		112		55
Substitute	Wood box		2.0		91		57
Lemon oil	Steel drum	None	10.3	55	435	380	53
Do	Wood box	2 cans, 35 lb. each	2.0	9	84	70	53
Do	do	2 cans, 25 lb. each	1.5	12	62	50	54
Lemons, fresh	Wood crate	do	2.8	8	84	76	75
Do	Wood box		2.5		80		70
Lenses, glass (see also Optical goods)	do		7.7		315		55
Licorice:							
Extract	do	None	4.9	29	289	260	37
Do	Steel drum	do	4.2	20	130	110	72
Do	Fiber carton	do	.8	2	54	52	31
Mass or paste	Wood box						36
Waste, liquid	Drum						70
Lighters, cigar	Wood box		4.0		179		48
Lighting plant	do		16.0		384		92
Electric, with battery	Wood box, skidded	None	57.9	422	2,250	1,828	57
Lightning arresters, electrical:							
12,000 to 15,000 v., 6 units	Wood box	do	19.8	111	300	180	148
3,000 to 6,000 v., 6 units	Fiber carton	do	7.1	30	120	90	133
1,000 to 3,000 v., 6 units	do	do	4.7	21	78	57	135
Lignin:							
Liquor	Wood barrel	do					46
Pitch. (See Pitch, lignin.)							
Powder	Bag	do					143
Lignum liquor	Barrel		13.7		650		47
Do	Drum		11.7		493		53
Lime (see also Chlorinated lime)	Wood barrel	None	5.7		200		64
Acetate of	Bag	do					90
Chloride of	Wood box		6.5		223		66
Do	Drum	None	12.0		500		52
Citrate of	Wood barrel		9.2		246		83
Do	do		9.2		240		86
Do	do		9.2		204		99
Do	do		8.1		181		100
Common	Drum		5.1		262		43

Hydrated	Bag	None	2.0		100		45
Phosphate of	Wood barrel	do					64
Linoleum:							
Rolls	Cloth roll	Packing material	21.0	30	958	914	49
Do	do	do	10.3	30	338	302	68
Do	do	do	5.3	15	175	153	68
Rolls, 2 yd. wide, 30 yd. long	do	do	15.5	35	738	703	47
Do	do	do	9.7	35	575	540	38
Terra cotta	Crate		18.0		613		66
Linseed. (See Flaxseed.)							
Linseed meal	Bag						60
Do	Cloth bag	None	2.8	1	101	100	62
Linseed oil	Steel drum	do	11.0	50	425	375	57
Do	Fiber carton	6 cans, 1 gal. each	1.2	2	53	45	50
Do	Wood box	1 can, 5-gal	1.1	7	47	38	51
Do	Wood barrel	None					60
Linseed oil meal	Burlap bag	do	3.1	1	112	111	62
Do	do	do	3.2	1	125	124	57
Litharge	Wood barrel	do					51
Lithopone	do	do	10.3		450		56
Do	do	do	15.2		715		52
Livers, frozen	Wire-bound box	do	.4	2	22	20	41
Do	Wire-bound box, paraffined partition.	do	1.3	6	56	50	52
Do	Wire-bound crate	6 tin pails, 10 lb. each	2.0	10	70	60	64
Livestock feed. (See Calf meal; Feed, mixed; and other specific names.)							
Lobster, canned	Wood box	Tins					51
Do	Fiber carton	do	.8		35		53
Locks, door	Wood box	60 boxes	4.4	28	163	120	62
Do	do	30 boxes	3.1	23	95	64	74
(100)	do	None	3.9	27	230	203	37
Do	do	Boxes	5.0	26	288	247	39
Loganberries, canned	do	6 cans, No. 10	1.2	9	53	40	51
Do	do	24 cans, No. 2	1.0	8	45	32	50
Logs, boxwood	Piece		7.0		272		60
Logs, partridgewood	do		63.0		2,307		60
Logwood extract (see also Dyewood)	Cask		12.3		617		45
Do	do		11.3		636		40
Do	Wood barrel	None					50
Dry	do	do	13.7	75	425	350	72
Liquid	do	do	13.7	75	625	550	40
Lubricating compound	Wood box		2.3		100		51
Lubricating oil (see also Grease)	Drum		11.2		464		54
Do	do		11.7		434		60
Do	Barrel		10.7		480		50
Do	do		13.4		517		78
Do	Wood barrel	None	12.9	73	450	377	64
Do	Wood box	2 cans, 5 gal. each	2.1	22	97	75	49
Do	do	10 cans, 1 gal. each	2.4	29	103	74	52
Do	Metal drum	None	10.7	52	470	418	51
Do	Metal half drum, 30-gal	do	6.3	30	265	235	53
Do	Steel drum	do	11.3	52	459	407	55

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Lubricating oil (see also Grease)—Continued.	Wood barrel	None	7.9	50	280	230	64
Do	Wood box	8 cans, 1 imperial gal. each	2.0	13	103	82	44
Do	do	24 cans, 1 qt. each	1.7	12	67	48	56
Do	Drum		11.0		454		53
Do	do		11.0		460		52
Do	do		12.0		458		57
Do	do		6.0		245		57
Do	Barrel		11.0		445		57
Do	do		11.9		468		57
Do	Case		2.3		100		52
Do	Carton		1.3		59		51
Do	Half drum		6.3		250		56
Do	Drum		10.7		456		53
Do	do		10.7		470		51
Do	do		11.7		464		56
Do	Pail		1.1		43		43
Handy	Case		1.6		36		98
Mutton	Crate	Drum	4.6		140		73
Lubricator (Detroit)	Wood box		3.0		112		60
Luggage (see also specific name):							
Traveling bags	do		52.0		200		590
Assorted, nested	Plywood box	Separators	36.0	65	250	183	320
Do	do	do	19.7	45	180	134	249
Trunks and traveling bags; 36-in., dress, nested with bags.	Paper-wrapped	None	10.5	6	115	109	204
Trunk, steamer, and traveling bag; 31-in., nested, 1 gladstone bag.	do	do	4.0	3	35	32	240
Lumber (see also specific name; and "Lumber" in Stowage of Special Cargoes):							
Cypress	Wood crate	do	32.0		420		170
Do							110
Fir	Wood crate	None	19.0		480		89
Do	do		19.0		480		89
Unprepared							56
Oak							48
Pine, ponderosa							73
Pine, rough pitch							92
Macaroni	Carton		1.0		28		80
Do	do		1.3		32		93
Do	Case		3.5		78		100
Do	Wood box		2.2		30		165
Dry	Fiber carton	None	.8	1	21	20	82
Machetes	Wood box		2.3		149		35
Machine oil	do		3.7		166		49

Machine packing. (See Packing.)							
Machinery (see also specific name):							
Cement mill	Packages		33.1		693		107
Cotton-ginning	Wood box		66.8		918		162
Elevator	do		37.0		1,270		66
Mining	do		.7		58		29
Do	do		2.7		90		68
Printing	do		13.2		266		111
Rolling-mill	do		349.5		12,060		65
Do	do		67.5		3,900		39
Do	do		96.2		2,350		92
Textile	do		21.3		446		107
Do	do		23.7		505		104
Do	do		18.0		434		95
Textile (knitting)	do		17.0		382		100
Machines (see also specific name):							
Accounting	do						140
Adding	do		10.0		166		132
Do	do						96
Addressing	do						106
Air-conditioning (see also Refrigerator equipment)	do						134
Bookkeeping	do						158
Calculating	do		30.0		561		120
Do	do						82
Coin-changing	do						140
Coin-operated	do		8.2		202		91
Do	do		8.2		145		126
Do	do						269
Dishwashing	do						175
Food-preparing (see also specific name)	do		6.3		103		73
Do	do		7.5		207		81
Do	do		14.3		393		82
Do	do		25.0		643		87
Do	do		23.2		588		89
Ironing:							
Electric	do		6.9		136		114
Do	do		27.6		525		118
Do	do		13.2		190		154
N. o. s.	do						196
Milking	do						96
Multoscope	do						102
Numbering	do						77
Pin table	do						204
Sewing	do		3.5		68		116
Do	do		6.8		131		116
Do	do		8.7		152		129
Do	do		7.0		97		159
Do	do		3.0		102		73
Do	do		3.0		103		70
Knocked-down	Case		7.7		138		126
Do	do		8.0		310		58
Do	do		5.6		190		65
Do	do		12.6		490		58

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Machinery (see also specific name)—Continued.							
Sewing, parts for	Case		5.0		195		57
Sewing, stands for	Packages		3.6		68		115
Washing	Wood box		20.5		341		135
Do	do		94.5		1, 543		137
Washing, clothes, parts for	do						178
Machine tools, metal-forming (see also Tools):							
Bar (screw) machine:							
4-spindle:							
2-in. motor drive, less motor	Wood box on skid	None	490.0	1, 550	17, 750	16, 200	63
1¾-in. motor drive, less motor	do	do	314.0	1, 200	10, 625	9, 425	66
1-spindle:							
1¾-in. motor drive, less motor	do	do	161.7	600	5, 090	4, 490	71
Beading machine, motor drive	Wood box	do	78.0	500	2, 700	2, 200	65
Chucker:							
6-spindle, 5¾-in. motor drive, less motor	Wood box on skid	do	779.0	1, 750	22, 400	20, 650	78
4-spindle, 6-in. motor drive, less motor	Wood box	do	356.0	1, 300	13, 050	11, 750	60
Circle shear and flanger	do	do	155.0	500	3, 000	2, 500	116
Flanging machine, motor drive	do	do	37.0	300	1, 400	1, 100	59
Grinding machine:							
Belt drive	do	do	120.0	755	5, 880	5, 125	46
6' x 30'', plain, hydraulic	do	do	264.0	1, 250	8, 450	7, 200	70
14' x 72'', plain, self-contained	do	do	644.0	3, 200	20, 100	16, 900	72
Jig borer	do	do	413.0	2, 600	10, 400	7, 800	89
Lathe, 12'' x 30''	do	do	134.0	1, 000	3, 700	2, 700	81
Milling machines:							
Belt drive	do	do	103.0	525	4, 975	4, 450	47
Dial type	do	do	212.0	1, 400	9, 800	8, 400	48
Punch press and dies	do	do	167.0	1, 500	8, 100	6, 600	46
Seamer, double, power-driven	do	do	179.0	1, 350	6, 150	4, 800	65
Shaper, vertical, 6-in	do	do	222.0	1, 530	6, 130	4, 600	81
Shear squaring, 30-in	do	do	31.6	150	650	500	109
Shear and squaring gauge, motor drive	do	do	186.1	900	3, 400	2, 500	123
Sliproll forming machine, motor drive	do	do	18.0	350	1, 250	900	33
Mackerel, canned	Fiber carton	Cans	1.3		59		46
Mackerel, fresh	Wood barrel	Ice and water	6.3	53	288	150	49
Magazines	Bundle		1.0		45		55
Do	do		12.0		442		60
Do	do		1.0		45		65
Do	do		1.0		40		60
Do	Sack		2.0		62		60
Do	Bundle		1.0		49		60
Do	Carton		1.0		58		45
Do	Bag		3.0		120		60
Do	do		3.0		114		60

Magnesia metal	Wood box						30
Magnesia, milk of. (See Milk of magnesia.)							
Magnesite, clinkered	Bag	None					25
Magnesium:							
Chloride	Drum		8.9		570		35
Do	do		8.8		420		46
Do	Crated drum		10.7		260		93
Do	do		11.2		276		97
Chloride anhydrous	do		10.7		260		93
Ingots	Drum	None	5.0		219		50
Metal	Package		1.0		106		28
Oxide	Drum		2.3		202		25
Sulfate. (See Salts, epsom.)							
Magnetos	Wood box		3.5		115		68
Do	do		2.0		108		42
Do	do		5.0		140		80
Magnets, steel	do		2.7		213		29
Malt	Bag	None	8.6		506		75
Do	do	do	3.0		90		75
Do	do	do	3.5		105		75
Powdered, dehydrated	Fiber carton						62
Malt extract	Wood barrel	None	9.0		280		72
Do	Wood box						44
Malted milk. (See Milk, malted.)							
Manganese chloride	Barrel		12.0		373		72
Do	do		11.9		364		73
Do	do		12.2		376		73
Manganese ore. (See Ore.)							
Mangle roller blocks. (See Blocks.)							
Manicure preparations	Wood box		2.5		68		82
Manila hemp. (See Hemp; Rope.)							
Maple:							
Sugar	do	None	1.0	7	72	65	29
Do	Fiber carton	do	.8	2	65	63	26
Do	Wood pail	do	.7	4	40	37	30
Syrup	Wood box	Steel drum	15.2	6	706	600	48
Do	do	do	7.6	6	396	330	43
Do	do	1 can, 5-gal.	1.7	5	65	55	57
Do	do	6 cans, 1 gal. each	1.8	5	80	66	51
Do	do	24 cans, 1 qt. each	2.0	5	88	66	50
Do	do	12 jugs, 1 qt. each	2.0	5	60	33	77
Marble, in the rough	Piece						17
Marmalade	Wood box, strapped	24 jars, 1 lb. each	1.1	9	50	25	49
Do	Wood box	24 tumblers	1.3	9	47	24	59
Do	Corrugated fiber carton	24 jars, 8 oz. each	.5	2	26	12	46
Match blocks	Wood box						232
Matches	do		2.0		42		106
Do	do		14.6		255		130
Strike anywhere	Fiber carton	144 boxes	2.6	5	42	20	140
Mats, cocoa fiber:							
1-lb	Cloth bale	None	7.0	2	82	80	187
2-lb	do	do	9.0	2	102	100	204
3-lb	do	do	11.3	2	122	120	204

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Mats and matting for wrapping silk and tea	Bale	None					150
Mattings, cocoa fiber, 60 yd	Cloth roll	do	17.5	2	182	180	172
Do	do	do	13.1	2	137	135	221
Mattresses (see also Bedsteads)	Bale	do	45.0		158		640
Matzo meal	Case						82
Matzoths	Wood box		12.2		216		126
Do	do						168
Do	Fiber carton						132
Maurah meal	Bag						84
Mayonnaise	Wood box	72 bottles, 4 oz. each	1.7	12	56	18	70
Meal. (See specific name.)							
Meat (see also specific name):							
Canned	do	Tins	1.0		51		55
Canned, n. o. s	Case		2.2		100		49
Do	do		1.3		53		53
Do	do		2.5		100		56
Fresh and smoked	Wood box, wire-bound	None	2.8	12	112	100	55
Do	do	do	1.5	8	58	50	56
In glass	Wood box	Glass jars	.7		28		53
Do	do	do	.5		19		57
Meat extracts (see also specific name)	do	12 bottles, 1 4/5 oz. each	1.0	14	34	8	66
Meat juice	do						67
Meat-slicing machinery. (See Slicing machinery.)							
Medicinal ointment	Case		5.3		139		84
Medicinal tablets	do		6.2		149		92
Medicines, n. o. s	do		1.1		20		120
Melons, honeydew	Wood box						72
Menhaden oil	Steel drum	None	10.7	54	493	439	49
Mercuric chloride (corrosive sublimate)	Wood box, paper liner	33 wood boxes, 3 lb. each	2.4	16	127	99	41
Mercuric iodide	Fiber drum, paper liner	None	1.0	6	106	100	41
Mercury	Iron bottle	do	.1	12	88	76	3
Do	Flask		.3		88		6
Do	do						13
Metabolism apparatus	Wood box						231
Meta cresol (see also Cresol)	Steel drum, ICC-5E, 55-gal	None	11.6	53	527	474	50
Metal scrap. (See Scrap.)							
Metallic packing. (See Packing.)							
Meters:							
Electric. (See Electric.)							
Oil and gasoline	Wood box						65
Water	do						40
Methyl acetone. (See Acetone, methyl.)							
Methyl alcohol. (See Alcohol, methanol.)							
Methyl glyco phthalate	Drum		11.7		576		45

Methyl isobutyl ketone	Steel drum, ICC-5E	None	11.7	52	402	350	65
Methylamines	Steel drum, ICC-5E, 55-gal	do	11.7	52	452	400	57
Methylene chloride	Drum		10.7		604		40
Do	do		11.2		604		41
Mica, ground (see also Isinglass)	Bag	None					67
Military drab	Roll	do	10.9		568		43
Milk:							
Condensed, canned	Case	Tins	1.3		64		47
Dried	Wood barrel	None	8.0		200		90
Evaporated:							
Canned	Case	Tins	1.0		52		43
Do	do	do	1.2		54		50
Unsweetened	Wood box	48 cans, 14½ oz. each	1.6	5	56	44	62
Do	do	96 cans, 6 oz. each	1.1	6	49	36	50
Do	Wood barrel	None					40
Malted	Solid fiber carton	12 cans	8.7		14		5
Do	do	do	.9	13.2	25	11.8	80
Do	Wire-bound box	4 cartons	1.8	16	56	40	72
Do	Wood barrel	None					70
Do	Wood barrel, paper liner	do	9.8	25	252	225	86
Do	Wood box	2 cans, 25 lb. each	2.4	8	66	50	80
Do	do	3 cans, 5 lb. each	.7	4	22	15	72
Do	do	24 jars, 15 oz. each	2.1	10	59	23	80
Chocolate	do	2 cans, 25 lb. each	2.4	7	64	50	83
Do	do	8 cans, 5 lb. each	1.7	7	56	40	68
Do	do	24 cans, 1 lb. each	1.2	5	38	24	72
Powdered	Drum	None	2.3		60		84
Do	Wood barrel	do					74
Do	Wood box	do	3.4		97		79
Do	do	do	2.4		110		49
Skim	Metal drum	do	2.2	10	60	50	82
Do	Wood barrel	do	8.1	23	223	200	81
Whole	Wire-bound box	5 cartons	3.4	38	98	60	77
Do	do	2 cartons	2.8	29	89	60	70
Do	Corrugated fiber carton	12 cans, 1 lb. each	.6	5	17	12	80
Sugar of. (See Sugar.)							
Milk bottles. (See Bottles.)							
Milk of magnesia	Wood box	Bottles	4.3		103		94
Liquid	Carton		1.3		43		69
Do	do		.9		28		73
Tablets	do		.9		20		102
Milk pans. (See Pans.)							
Millboard, asbestos	Wood box	Packing material	8.9	84	440	355	45
Do	do						43
Mills:							
Coffee	do		6.0		150		89
Corn	do		2.3		90		58
Grinding	do		17.8		486		82
Millstones	Hogshead	None	22.0		1,800		27
Mimeograph machines	Wood box						106
Mimeograph stencil sheets	Case		7.1		180		88
Mineral oil. (See specific name.)							
Mineral spirits	Metal drum	None	11.7	48	492	354	65

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Mineral water	Wood box	Bottles	5.0		200		56
Do	do	do	5.5		194		64
Mineral wool	Bag	None					160
Metal-reinforced	Wood box	do	29.4	90	550	460	120
Do	do	do	29.4	90	450	360	146
Mirrors, pocket	do		6.0		305		44
Mirrors, rear-view	do		10.9		182		134
Mistol drops	do	Packages	1.0		34		83
Mixers, electric. (See Electric).							
Mohair	Bale	None					160
Molasses	Barrel		12.7		671		42
Do	Tierce		14.1		661		48
Do	Cask		19.7		673		65
Do	Wood barrel	None	13.9	70	710	640	44
Do	Fiber carton	6 cans, No. 10	1.2	2	63	56	41
Do	do	24 cans, No. 2½	1.2	2	63	55	41
Do	do	36 cans, No. 1½	1.0	2	52	43	41
Blackstrap	Wood cask	None					50
Mold, tire	Piece		36.0		3,295		25
Molybdenite concentrate	Wood barrel	None	9.9	50	600	550	37
Do	Wood box						28
Monel metal (see also Scrap monel metal)	Wood barrel	None	9.0		577		35
Do	Wood box						10
Monochlorobenzol. (See Coal-tar intermediates.)							
Montan wax. (See Wax, montan.)							
Mops	Bale	None	10.3		174		132
Mortars, high-temperature	Steel drum	do	5.6	27	527	500	24
Do	do	do	2.8	14	264	250	24
Do	do	do	1.2	7	107	100	24
Do	Cloth bag	do	.9	1	101	100	20
Chrome	Wood crate	Steel drum	2.2	11	221	200	22
Moss	Compressed bale	None					275
Mother-of-pearl shells	Wood box						42
Motorboats	Cradled		290.5		1,645		395
Motorcycles	Case		32.7		612		121
Do	Wood box		20.2		510		89
Motors, electric. (See Electrical equipment.)							
Mowers, lawn	do		2.0		46		95
Not power-driven	do						84
Power-driven	do						140
Multigraph machines	do						105
Mushroom spawn	Fiber carton						117
Music, printed	Wood box		14.0		675		48

Musical instruments:[3]							
Accordions, piano, with fitted case	do	Separators	3.2	15	55	35	132
Assorted, with fitted cases (12)	do	Packing material	34.0	110	283	126	280
Bass viol (double bass)	do	do	30.0	143	189	21	302
Cornets, with fitted case (12)	do	do	10.4	65	175	84	132
Gongs	do	do	14.1	60	192	110	160
Saxophones, with fitted case (6)	do	do	34.0	110	255	120	280
Do	do	do	10.4	65	150	81	160
Saxophones, without fitted case (6)	do	do	34.0	110	200	60	373
Do	do	do	10.4	65	105	32	224
Trombones, with fitted case (6)	do	do	14.3	60	136	66	249
Trombones, without fitted case (6)	do	do	14.3	60	105	27	320
Xylophones	do	do	3.4	18	76	48	102
Mussel shells	Bag	None					59
Mustard:							
Dry	Wood box	Tins	1.0		22		102
Flour	Barrel		9.2		252		81
In glass	Case		.9		31		66
Do	do		2.4		83		65
Powdered	Wood barrel	None					100
Seed. (See Seed.)							
Nails:							
Corrugated	do	do					45
Horse	Bundle		1.3		99		28
Iron	Keg	None	1.5		83		40
Shoe	do	do	1.3		106		26
Do							17
Steel, coated	Keg		1.7		77		51
Steel, n. o. s	Barrel		6.0		299		45
Do	Keg		1.5		112		30
Wire	Wood box	Packages	1.9	18	173	150	25
Do	do	do	1.5	15	151	132	22
Do	do	None	1.4	15	127	112	24
Do	do	do	1.2	14	114	100	23
Do	do	do	.8	11	67	56	26
Do	Wood keg	do	1.9	9	142	133	30
Do	Cloth bag	do	1.4	2	112	110	27
Do	Wood keg	do	1.1	5	105	100	22
Do	Cloth bag	do	.5	1	56	55	20
Do	Wood keg	do	1.1	5	55	50	43
Naptha, solvent	Metal drum	do	11.7	48	360	312	73
Napthalene. (See Coal-tar intermediates.)							
Naphthenate metal, in dry or solid form	Drum	do					54
Naphthol	Steel drum, 65-gal	do	13.8	44	294	250	105
Napthol, beta. (See Coal-tar intermediates.)							
Napkins, paper	Corrugated fiber carton	do	2.8	3	25	22	249
Do	Wood box		14.3		113		284
Do	do						146
Do	Fiber carton						268
Neat's-foot oil	Wood barrel	None	12.0		450		60
Needles, sewing-machine	Package		2.7		98		60

[3] Net weight of instrument with case includes weight of case.

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Needles, talking-machine, steel	Wood box		1.0		103		22
Newspapers, old	Bale	None	8.0		280		64
Do	do	do	8.0		272		69
Do	do	do	8.0		200		90
Nickel alloy sheets	Wood box	do	7.4	140	680	540	24
Nickel-copper alloy sheets	do	do	7.4	140	680	540	24
Nickel carbonate	Drum		12.3		355		78
Nickel cathodes, slabs	Wood barrel	None	10.1	60	1,235	1,175	18
Do	Wood keg	do	5.4	35	625	590	19
Do	do	do	3.4	27	447	420	17
Do	Wood barrel	do	10.4	60	910	850	26
Do	Wood keg	do	5.6	35	575	540	22
Do	do	do	3.3	27	417	390	18
Nickel formate	Barrel		13.3		568		53
Do	Drum		3.7		114		70
Nickel ingots	Wood barrel	None	10.1	60	1,410	1,350	16
Do	Wood keg	do	5.4	35	735	700	16
Do	do	do	3.4	27	467	440	16
Do	do	do	3.3	27	467	440	16
Do	do	do	5.6	35	735	700	17
Do	Wood barrel	do	10.4	60	1,410	1,350	16
Nickel oxide	Wood keg	do	5.6	35	435	400	29
Do	Wood barrel	do	10.4	60	860	800	27
Do	do	do	10.1	60	960	900	60
Do	Wood keg	do	5.4	35	460	425	26
Do	Drum	do					55
Nickel slabs	Wood barrel	do					20
Nigrosine. (See Coal-tar colors.)							
Nitrobenzol. (See Coal-tar intermediates.)							
Nitrocellulose, wet. (See Collodion cotton.)							
Noodles	Wood box		1.0		18		123
Novelties	do		13.0		161		180
Nujol	do	Bottles					80
Nutmegs	Bag	None					80
Nuts, edible, etc. (See specific name.)							
Nuts, iron, hexagonal	Wood box	Boxes	2.3	17	260	235	20
Nuts, metal	Case		3.3		145		50
Nylon:							
Bristle material	do		2.3		104		50
Flake	Drum		7.1		203		78
Do	do		7.8		195		91
Polyner	do		7.1		200		79
Do	do		7.8		190		88

Oak:							
Beading	Wood crate	None	7.0		115		136
Do	do		7.0		115		133
Extract	Wood barrel	None	15.0		640		53
Squares							75
Oakum	Bale	None	4.3		50		190
Oars	Bundle		3.5		85		92
Do	do		4.9		106		104
Do	do	None	4.0		105		92
Do	Wood crate	do	16.0		353		100
Oatfeed	Bag	do					100
Do	do	do	8.5		220		77
Oatflake	do	do					90
Oatmeal, ground	Burlap bag	do	3.0	1	101	100	67
Do	Wood box	24 tin cans	1.4	21	69	48	51
Oats	Bag	None					83
Do	Bulk						76
Clipped	Bag	None					74
Do	Bulk						66
Rolled	Burlap bag	None	3.0	1	91	90	74
Do	do	do	3.5	1	111	110	71
Do	do	do					80
Do	Corrugated fiber carton	36 tin cans	1.6	13	58	45	62
Do	do	72 tin cans	1.6	18	59	41	62
Do	Wood box	36 tin cans	1.8	22	67	45	60
Do	do	72 tin cans	1.8	26	67	41	60
Do	Fiber carton	36 cans, 20 oz. each	1.4	4	61	45	52
Ochre (see also Colors in oil)	Wood barrel	None	9.7		275		79
Do	do	do	5.4		210		60
Do	Keg	do	2.5		112		50
Office equipment, n. o. s.	Wood box		8.0		148		115
Oil-burner equipment	Case		41.3		694		132
Do	do		34.5		570		134
Oil burners	do		7.0		155		101
Do	do		11.5		227		112
Do	do		6.2		159		87
Oil cake	Bag	None	5.7		383		33
Do	do	do	5.7		353		36
Cottonseed	Loose						38
Linseed	Bag	None	5.2		373		31
Do	do	do	5.7		337		38
Do	do	do	4.6	3	355	352	29
Palm kernel	do						52
Peanut	Loose						63
Soybean	Bag						52
Oilcloth	Case		13.7		639		48
Do	do		15.3		600		57
Do	do		9.1		334		61
Do	Carton		7.3		274		59
Do	Case		6.9		268		57
Do	do		10.9		410		60
Clippings	do						60

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Oilcloth—Continued.							
Floor covering	Roll						51
Do	Bundle		1.3		50		56
Do	do		1.9		70		62
Do	Roll		4.5		209		48
Do	do		1.1		26		93
Not flooring	Case		10.3		478		48
Do	do		8.8		245		81
Do	Carton		6.5		277		53
Table	Wood box	30 rolls, 12-yd., 50" wide	8.7	56	431	375	45
Do	Case						57
Do	Wood box	25 rolls, 12-yd., 46" wide	7.0	43	317	274	50
Do	Bale, wrapping	25 rolls, 12-yd., 50" wide	2.9	3	128	125	51
Oiled clothing	Wood box		11.0		203		122
Oil-mill machinery:							
Cake breaker	do	None	50.0	330	1,770	1,440	63
Cottonseed cleaner	do	do	520.0	2,120	8,220	6,100	142
Hull beater, single-cylinder	do	do	350.0	1,720	4,520	2,800	174
Huller, disc	do	do	65.0	410	2,390	1,980	61
Separator purifier	do	do	840.0	3,660	7,390	3,730	255
Shaker, double-tray	do	do	260.0	800	2,100	1,300	277
Oil stain	do	6 cans, 1 gal. each	1.8	12	62	45	64
Do	do	24 cans, 1 qt. each	1.9	12	65	45	64
Do	do	48 cans, ½ pt. each	1.0	9	43	26	53
Oil-well machinery (see also Tools)	do		3.1		78		88
Do	do		185.3		4,590		92
Drilling engine, twin-cylinder	do	None	244.0		9,670		56
Drilling machine parts	Pieces		6.8		1,599		10
Do	do		5.8		1,100		12
Hoist	Wood box	None	1,134.0		29,600		86
Oil-gauging tapes	Case		2.0		59		76
Oilstones	Wood box		1.9		143		30
Oil stoves	do		28.0		440		140
Swivel	do	None	167.0		4,450		86
Oils. (See specific name.)							
Oils and greases, sulfonated	Wood barrel	do	13.7	70	525	455	59
Do	Steel drum	do	10.4	55	460	405	51
Oiticica oil	Wood barrel	do					55
Oleic acid. (See Acid.)							
Oleomargarine	Tub	do	2.0		73		61
Do	Wood box		3.0		125		53
Oleo oil	Tierce		12.0		453		59
Do	do		12.3		449		61
Oleo stearine	Barrel		9.7		342		63

Do	do		9.7		338		64
Do	do		9.7		330		66
Do	do		10.8		333		73
Oleum, 65-percent, on deck	Drum		16.4		1,054		35
Olives:							
Canned	Fiber carton	6 cans, No. 10	1.1	3	48	41	50
Do	do	48 cylinders, 1 pt. each	1.1	3	63	51	38
Do	do	24 cans, No. 2½	1.2	3	55	46	48
Do	do	48 cans, No. 1, tall	1.3	3	63	51	48
In brine	Wood cask	None					52
In glass	Wood box	Glass jars	1.2		47		56
Onions	Cloth bag	None	2.9	1	51	50	124
Do	do	do	3.5		100		78
Do	Half crate	do	1.8		60		66
Do	Wood crate	do	3.5		121		65
Do	Wood barrel	do	7.0		150		104
Opax whitening compound	Barrel		7.4		532		31
Optical goods (see also Lenses; Spectacles)	Wood box		4.8		138		78
Do	do		12.7		113		251
Optical goods, lenses	do		5.3		146		78
Orange:							
Juice	do	6 cans, No. 10	1.2	9	49	36	55
Do	do	24 cans, No. 2	1.0	8	40	27	56
Do	do						50
Oil	Steel drum	None	10.3	55	435	380	53
Do	Wood box	2 cans, 35 lb. each	2.0	9	84	70	53
Do	do	2 cans, 25 lb. each	1.5	12	62	50	54
Do	Case		6.8		169		90
Peel	Wood box						90
Do	Bag	None					115
Oranges, fresh	Wood box	do	3.0		90		75
Do	do	do	2.6	11	90	79	66
Do	Wood crate	do					60
Orchic substance	Wood box		5.3		126		93
Ore (see also specific name):							
Antimony	Bag	None	1.3		125		24
Do	do		1.7		157		24
Do	do		2.3		160		32
Do	do		1.7		110		34
Do	do		2.3		111		45
Do	do		1.0		159		15
Bauxite	do	None					45
Concentrates	Drum		8.1		476		38
Chrome	Bulk						12
Ilmenite	Bag	None					16
Iron, crushed or powdered	Drum	do					17/21
Lithium, crushed	Bag	do					25
Manganese	do	do					25
Milled mix	do	do	1.3		95		30
Rutile	Barrel		5.3		519		23
Do	Bag	None					32
Tungsten	do	do					37
Vanadium	do	do					25/30

UNITED STATES EXPORT AND REEXPORT COMMODITIES—*Continued*

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Organ, pipe	Wood box		36.3		270		301
Organs	do		45.0		400		250
Do	do		48.0		300		358
Overshoes, rubber:							
Men's	Fiber carton	Cartons	4.2	3	44	33	204
Women's	do	do	3.0	3	18	10	373
Oxygen	Cylinder		1.5		128		26
Oyster shells	Bag	None					40
Oysters:							
Canned	Fiber carton	48 cans, No. 1, tall	1.2	3	63	51	44
Do	do	48 cans, No. 1 (Eastern oyster)	.8	3	43	34	43
Do	Wood box	do	1.0	6	47	34	49
In the shell	Wood barrel	None	7.3	20	270	250	61
Packing:							
Asbestos	Wood box		11.0		450		54
Do	do		6.3		354		40
Do	do		7.0		215		73
Do	do		8.0		240		74
Do	do		3.3		76		98
Asbestos and rubber	Case		7.8		342		47
Do	do		5.7		251		51
Coil, flax	Wood box		7.0		160		98
Flax	do						70
Machine	do		1.5		38		88
Metallic	do		5.3		372		32
Rubber	Bale		6.0		461		29
Do	Wood box		7.2		329		47
Paddles, wood	Fiber carton						99
Paddy machine	Wood box	None	210.0	300	1,500	1,200	311
Do	do	do	380.0	900	3,800	2,900	224
Padlocks	do		6.0		237		58
Do	do		5.9		410		32
Do	Plywood boxes	Boxes	2.1	12	205	188	23
Do	Wood box	25 boxes, 1 doz. each	1.4	12	122	108	25
Do	do	do	1.4	12	73	50	41
Cabinet	do		4.1		85		108
Pails	Bundle		3.3		70		100
Paint	6-gal. cases		1.8		139		29
Do	Case		1.5		43		78
Do	do		1.5		60		56
Do	do		2.9		118		55
Do	Carton		1.0		31		72
Do	Case		2.0		81		55
Do	do		2.0		108		41

Flat white	Wood box	6 cans, 1 gal. each	1.8	12	120	103	33
Do	do	24 cans, 1 qt. each	1.9	12	125	105	33
Do	do	do	.9	8	67	53	31
Red barn	do	6 cans, 1 gal. each	1.8	12	86	68	47
Do	do	24 cans, 1 qt. each	1.9	12	87	67	48
N. o. s.	Wood barrel	None					56
N. o. s.	Wood keg	do	1.5		56		58
Paint compound	Drum	do	11.0		460		52
Paint sprayers	Carton		.6		7		186
Glass tanks	do		.4		7		133
Paint spray kits	Case		17.5		330		119
Pajamas, cotton	Wood box	Cardboard boxes	25.7	105	250	145	87
Pamphlets or tracts	do						90
Paneling, asbestos:							
42" x 96" x 3/16"	Wood crate	None	13.3	57	1,056	999	28
42" x 96" x 1/2"	do	do	13.3	57	866	809	34
42" x 96" x 3/4"	do	do	13.3	57	897	840	33
42" x 96" x 1"	do	do	13.3	57	912	855	32
96" x 42", corrugated	do	do	13.3	57	540	483	55
Pans, milk	Wood box		17.3		328		117
Paper (see also specific product):							
Absorbent	do						390
Asphalt waterproof kraft	Paper-wrapped bale, 6 rolls	None	5.0	7	128	121	88
Bag-lining	Wood box		24.3		175		310
Blotting	do		18.0		516		78
Do	do		11.0		291		88
19" x 24", 5 reams:							
80-lb.	do	None	13.5	100	505	405	75
100-lb.	do	do	16.4	128	630	502	72
Uncut	do						70
Bond	do	None	9.0	72	560	488	36
Bristol	do	Ream wrappers	9.6	64	472	408	46
Building	Roll	None	10.3		169		135
Carbon	Wood box		12.0		270		100
Do	do						90
Coated, No. 13	do	None	8.1	65	272	207	66
Coated, No. 24	do	do	9.3	67	351	284	59
Cash-register	do		11.0		362		69
Cellophane	Fiber carton						193
Cigarette	Wood box		22.3		632		79
Do	do		8.8		232		85
Do	do		14.0		344		91
Do	do		16.3		402		91
Cleansing tissue	Fiber carton						273
Do	Corrugated fiber carton	Paper boxes	5.3	11	52	41	229
Do	do		3.6		35		224
Do	do		4.3		37		257
Do	do		4.4		37		267
Kleenex	Fiber carton	Cardboard boxes	4.0		31		277
Corrugated	Roll	None					192
Crepe	Wood box		26.6		300		198
Do	Fiber carton						182

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Paper. (See also specific product.)—Continued.							
Crepe—Continued.							
Kraft	Corrugated fiber carton	None	6.6	7	69	62	155
Do	do	do	6.6	7	54	47	273
Do	do	do	5.9	7	83	76	159
Do	do	do	5.9	7	90	83	146
Emery. (See Emery paper.)							
Felt. (See Felt.)							
Fiber	Roll	do	2.9		140		47
Fly	Wood box		7.1		228		70
Do	Wood crate		10.0		300		75
Fruit-wrapping	do	None	7.8		254		70
Glassine	Wood box		12.0		577		45
Do	do		10.3		661		35
Opaque	do	Ream wrappers	8.4	49	547	498	33
Glazed	do		8.0		408		45
Gravure printing	do	Ream wrappers	8.6	60	380	320	51
Greaseproof	do		8.0		358		50
Parchment	do	Ream wrappers	9.6	62	569	507	38
Hydrated semibleached sulfite	Paper-wrapped rolls	None	3.8	3	157	154	54
Kraft	Wood box		34.1		782		98
Krinkled	Roll	None					90
Do	Bundle	do					60
Machine-finished	Paper-wrapped bundles	do	4.7	6	200	194	53
Treated	Roll	do	32.3		1,393		52
Do	do	do	35.7		1,792		54
Lithograph	Wood box		18.6		700		59
Mimeograph	do	Ream wrappers	12.4	72	500	428	65
Newsprint	Roll	None					82
Do	Cardboard wrapper	do	7.3	14	264	250	62
Do	do	do	52.5	20	1,600	1,580	74
Do	Roll	do	16.5		580		64
Do	do	do	35.0		985		80
Do	do	do	10.7		543		41
Do	do	do	11.2		535		47
Do	do	do	12.3		559		49
Note	Wood box		8.0		290		62
Photographic	do		6.0		235		56
Do	do		6.7		250		60
Do	do		8.5		290		66
Do	do		4.2		95		97
Do	do		4.2		89		107
Photostat	do		3.7		89		94
Do	do		3.2		96		74

Printing	do		13.7		600		51
Do	do		8.3		329		56
Do	do		10.8		432		56
Do	do		16.0		586		61
Do	do		13.1		646		45
Do	Roll		10.3		401		58
Do	do		12.7		486		58
Do	do		20.5		701		66
Do	do		6.7		233		65
Do	Bundle		3.9		171		51
Do	do		4.1		102		56
Do	Wood box		13.7		505		61
Do	do		12.1		697		30
Do	do		10.3		586		39
Do	do		14.0	75	575	500	55
Do	Corrugated fiber carton		3.5	6	156	150	49
Linen-finished	Wood box	Ream wrappers	7.0	74	586	512	27
Offset	do	do	7.8	70	620	550	28
Roofing	Wood crate		1.7		105		36
Do	do		2.4		132		41
Do	do		2.2		110		44
Do	do		2.2		105		46
Do	Roll		1.7		82		46
Do	do		1.7		75		50
Do	do		1.7		79		50
Do	do		2.1		84		55
Do	do						84
Prepared	do		1.7		63		58
Sand	Bale		3.5		188		41
Do	Wood box		7.5		187		89
Do	do		9.2		339		61
For shoe purposes	do		10.4		336		69
Soda straw	Roll						56
Tabulating-machine	do		6.2		285		49
Tagstock	do						164
Tissue (see also Paper, cleansing tissue)	Wood box		16.0		404		90
Do	Large roll						158
Do	Wood box		4.0		144		62
Do	do		37.0		753		110
Do	Roll		15.7		568		62
Do	do		11.5		385		67
Do	do		15.7		510		60
Do	do		15.2		480		70
Do	do		8.0		242		74
Do	do		16.7		196		191
Toilet	Fiber carton		5.3		57		206
Do	do		3.7		33		249
Do	do		4.4		32		304
Do	Wood box		3.4		71		107
Do	do		2.5		52		108
Do	do		4.7		76		136
Do	do		5.4		53		229

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Paper. (See also specific product.)—Continued.							
Toilet—Continued.	Corrugated fiber carton		5.6	8	68	60	185
Do	do		4.6		54		190
Do	do		3.2		35		202
Towel stock	Fiber carton		3.2		50		141
Do	do		3.5		50		156
Wall	Wood box		12.0		100		270
Do	do	None	11.7		232		114
Do	do	do	11.5		367		70
Do	do	do	24.5		312		172
Do	do		24.0		410		133
Do	do		10.0		150		144
Do	Bundle		15.0		291		116
Do	do		16.5		307		120
Do	do		1.9		34		129
Do	Bale						122
Do	Wood box						113
Waste	Bale	None	28.0		525		120
Do	do	do	54.0		1,282		95
Compressed	do	do	43.3		1,022		95
Do	Bag	do	3.9		146		60
Waxed	Wood box		15.8		548		64
Welding, twisted							248
Wrapping:							
Black	Wood box						63
Kraft	Bale						51
Do	Paper-wrapped roll	None	9.6	3	200	197	108
Do	Bale	do	13.3		500		59
Do	Roll	do	10.8		344		71
Do	Bundle	do	4.3		118		83
Do	do	do	5.3		137		88
Do	do	do	4.7		107		97
Manila	Wood box		26.1		652		89
Tissue	Roll		3.4		174		44
Do	do		8.0		242		74
Do	do		6.7		182		82
Waxed	Fiber carton		9.6		437		50
Do	Wood box		3.8		186		46
Do	do		12.1		503		54
Do	do		8.2		326		56
Do	do		11.2		449		56
N. o. s	do		13.8		533		58
Do	Roll		5.8		264		49
Do	do		4.0		133		67
Do	do		2.3		70		74

Do	do		5.3		147		80
Do	Bundle		16.0		483		74
Do	Wood crate		9.0		272		78
Writing, uncut (see also Stationery)	Wood box		13.2		604		49
Do	do		1.3		60		50
Do	do		15.0		550		61
Paperboard	Roll		59.3		3,216		41
Do	do		59.3		2,850		46
Do	do		32.4		986		73
Do	do		121.0		3,000		90
Do	Wood box		20.0		954		47
Do	do		13.0		602		49
Do	do		20.0		839		53
Kraft-lined	Roll		34.1		923		83
Woodpulp	do		6.9		257		60
Do	Bundle		2.9		112		58
Paper pulp	Wood box		11.5		293		87
Paper stock	Bale	None	25.0		575		100
Papeteries	Wood box		17.0		172		224
Do	do		17.8		369		107
Paprika, ground	Fiber carton	24 cans	.2	1	6	3	83
Parachlorophenol	Drum		7.7		373		46
Do	do		10.7		503		48
Para-Dichloro-Benzene	Wood barrel	None	9.6	24	274	250	77
Paraffin. (See Wax.)							
Parahydroxyldiphenyl	Barrel		9.7		226		96
Paraldehyde	Steel drum	None					57
Paranitraniline. (See Coal-tar intermediates.)							
Paraphenylenediamine. (See Coal-tar intermediates.)							
Paris green	Wood box		3.2		134		53
Paste	Wood barrel	None	2.1		50		94
Do	Drum	do	7.0		320		48
Adhesive	Wood barrel	do					52
Do	Wood box						65
Casein	Wood barrel	None	4.0		115		70
Flour	Bag						67
Do	Wood barrel		12.3		320		86
Shoe	Wood box		12.3		370		74
Synthetic	Pail		1.1		45		54
Patterns	Package		5.0		99		122
Paper	Wood box		6.7		290		52
Do	do		8.0		223		80
Do	do		17.3		368		105
Do	do		15.0		265		127
Peaches:							
Canned	do	6 cans, No. 10	1.0	7	52	41	45
Do	do	24 cans, No. 2½	1.3	6	57	44	53
Do	do	48 cans, No. 1, tall	1.4	7	65	48	47
Do	do	Cans	1.3		52		54
Dried	do	72 cans, 8 oz. each	1.1	7	52	36	48
Do	Wood drum	None	5.1	14	212	198	53
Do	do	do	3.0	11	121	110	55

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Peaches—Continued.	Wood box	None	1.4	6	61	55	50
Dried—Continued	do	do	.3	2	14	11	55
Do	do	24 tiles, 1 lb. each	.6	5	29	24	46
Peanuts:							
Salted	do						85
Shelled	do	None	5.1	20	180	160	64
Do	Bag	do	5.0		163		65
Unshelled	do	do	11.0		102		240
Pears:							
Canned	Wood box	6 cans, No. 10	1.0	7	51	40	45
Do	do	24 cans, No. 2, tall	.9	6	42	30	46
Do	do	48 cans, No. 1, tall	1.4	8	65	48	47
Do	do	72 cans, 8 oz. each	1.1	7	52	36	48
Do	do	Cans	1.3		52		54
Dried	Wood drum	None	3.0	11	121	110	55
Do	Wood box	do	1.4	6	61	55	50
Do	Fiber carton	24 tiles, 1.1 lb. each	.5	4	30	26	37
Do	Bag		2.8		121		53
Do	do		2.4		100		54
Do	do		2.8		112		56
Do	do		3.0		113		59
Do	do		2.7		100		62
Do	do		3.2		113		63
Fresh	Box		1.5		50		67
Do	Wood box	None	1.4	7	53	46	57
Do	Wood half box	do	.8	3	28	25	64
Do	Wood barrel	do	6.7		160		95
Do	Basket	do	2.8		60		127
Peas:							
Canned	Wood box	24 cans, No. 2	1.0	8	43	30	52
Do	do	24 cans, No. 3	1.6	11	68	51	52
Do	do	6 cans, No. 10	1.2	9	52	30	52
Dried	Bag	None	2.3		100		52
Do	do	do	3.0		112		60
Pecans:							
In the shell	Cloth bag	do	2.0	1	51	50	90
Do	do	do					79
Shelled	Fiber carton	do	1.9	4	64	60	66
Do	do	10 cartons, 5 lb. each	1.9	4	59	50	72
Pectin:							
Apple	Wood box		8.0		280		65
Citrus	Barrel		6.7		220		68
Do	do		7.7		221		77

Liquid	Wood barrel	None					51
Do	Wood box	Tins					41
Do	Fiber carton	Glass bottles					70
Pegs, wood	Bag	None					134
Pegwood	Wood box						101
Pencil:							
Clips. (See Clips.)							
Sharpeners	do		6.8		150		102
Slats	Bag		2.4		74		72
Do	do		2.8		82		76
Do	do		2.7		80		77
Do	do		3.9		94		93
Do	do	None	2.4		60		91
Pencils:							
Lead	Wood box		24.3		504		107
Do	do		20.9		448		105
Mechanical	do						132
Slate	do		2.6		168		35
N. o. s	do		2.0		60		74
N. o. s	do		7.1		157		101
Penholders, wooden	do		12.5		181		155
Pen points, plain or carbon steel	Fiber carton	100 boxes, 1 gross each	.6	1	24	17	55
Do	do	25 boxes, 1 gross each	.1	1	6	4	52
Pens:							
Fountain	do		3.0		50		134
Do	do		20.0		300		149
Gold	do		.8		10		187
Steel	do		2.1		60		40
Pepper (see also specific name)	Bag	None	6.0		133		98
Whole, black	Cloth bag lining	do	4.7	3	135	132	80
Do	Wood drum, lining	do	1.3	5	30	25	93
Peppermint essence	Drum		11.7		496		52
Peppermint oil	Case	3 cans, 20 lb. each	3.4	24	84	60	91
Do	do	10 bottles, 5 lb. each	5.9	75	125	50	106
Do	Metal drum	None	12.7	53	453	400	63
Do	Case		3.0		80		88
Do	Drum		12.0		458		57
Do	do		12.0		480		53
Do	do		15.0		506		65
Do	Case		3.2		82		86
Peppershakers, glass	Barrel		10.0		135		166
Perambulators	Wood box						370
Percolators:							
Aluminum	do	24 cartons	12.9	32	81	37	373
Do	do	12 cartons	5.0	20	45	19	249
Do	do	24 cartons	3.0	18	52	24	132
Do	do	12 cartons	1.5	12	29	12	118
Plated	do	12 boxes	8.0	28	75	32	249
Perfumery	do	Bottles	4.0		100		90
Periodicals	do		14.0		650		48
Do	Fiber carton		1.0		44		58
Do	Bag	None	2.0		140		35
Do	Bale	do					35

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Petrolatums	Steel barrel, 50-gal	None	12.4	75	450	375	62
Do	Steel barrel, 30-gal	do	7.9	50	280	230	64
Do	Wood barrel	do	11.9	70	420	350	64
Do	do	do	14.1	70	468	398	68
Do	Barrel		12.7		466		61
Do	Drum	None	12.0		454		59
Petroleum:							
Crude	Wood barrel	do	12.0		450		60
Do	Wood box	Tins	1.6		82		50
Do	Cask	None	12.5		433		65
Emulsion	Wood box		3.2		108		66
Pharmaceuticals, n. o. s	Case		5.3		203		59
Do	do		5.6		145		86
Do	do		3.2		72		98
Do	do		6.2		136		102
Phenacetine	Wood box		1.8		44		93
Phenol	Steel drum, ICC-6H, 25-gal	None	4.7	18	218	200	48
Do	Wood barrel	1 can and sawdust	10.0	24	273	200	83
Do	Drum		11.7		532		49
Do	do		11.7		502		52
Butyl	do		8.4		376		50
Do	do		8.4		371		51
Do	do		8.6		372		52
Do	do		8.7		369		53
Para, tertiary, amyl	do	None					53
U. S. P. (carbolic acid crystals)	Metal drum, ICC-5J	do	11.7	70	520	450	50
Phenolene	Wood box	6 cans, 1 gal. each	1.8	12	60	52	59
Do	do	24 cans, 1 qt. each	1.9	12	69	49	59
Phenolphthalein. (See Coal-tar intermediates.)							
Phonographs	do		19.5		100		437
Do	do		12.0		90		299
Phosphate:							
Calcium	Wood barrel	None					59
Rock	Sack		2.8		144		45
Do	Gunnies		3.0		152		45
Do	Bulk						32
Triphenal	Wood barrel	None					83
Tri-sodium (see also Sodium phosphate)	Bag		1.1		68		37
Do	do		1.3		76		37
Do	do		3.4		167		46
Do	do		1.1		51		47
Do	do		1.7		77		48
Do	do		2.3		111		51

Do	do		2.6		114		51
Do	Barrel		8.9		350		57
Do	Wood barrel	None					77
Phosphorus	Drum	do					37
Sesqui-sulfide	Wood box		3.1		175		39
Photo cards	do		24.0		432		124
Photographic (see also Film):							
Carbons. (See Carbons.)							
Chemicals	Drum		1.1		32		76
Developer	do		5.0		125		82
Dry plates	Case		1.8		47		87
Do	do		5.1		132		86
Goods, n. o. s	Package		9.0		333		62
Material	Case		.9		30		68
Mounts	Wood box	Cartons	14.4	57	321	236	102
Papers (see also Paper)	do	300 cartons	10.3	48	385	270	112
Plates	do	200 cartons	3.4	30	200	152	38
Piano	do		90.4		1,100		184
Do	do		78.0		850		200
Player	do		20.0		283		160
Rolls. (See Rolls.)							
Pickles	do	6 cans, 1 gal. each	1.2	6	73	59	37
Do	Fiber carton	do	1.1	2	66	59	39
Do	Wood box	12 bottles, packing material	1.2	6	46	22	59
Do	Fiber carton	do	.7	2	40	22	41
Do	Wood keg	None	1.3		31		94
Do	Wood half barrel	do	7.0		250		63
Do	Wood barrel	do	12.0		450		60
Do	Wood box	24 bottles, packing material	.8	5	32	10	58
Do	Fiber carton	do	.8	2	27	10	64
Pigments, paint (see also specific name)	Wood box		11.0		558		43
Pigs' feet, dry-salt	do	None	1.4	6	72	50	44
Pigs' feet, pickled	Tierce	do	11.0		375		65
Pilchards, canned	Wood box	Cans	1.6		70		50
Pile points (cast steel)	Loose		.9		34		60
Pillowcases, bleached cotton	Wood box	None	10.6	66	281	215	85
Pimento	Bag		10.0		179		125
Do	do		9.8		152		145
Do	do	None	7.1		155		103
Do	do	do	9.0		157		125
Pineapples, canned	Wood box	6 cans, No. 10	1.2	6	49	39	53
Do	do	24 cans, No. 2½	1.3	6	58	45	52
Do	do	Cans	1.4		60		53
Pine:							
Essence, white	Drum		10.7		476		51
Oil	do		10.4		472		49
Do	do		10.7		481		50
Do	do	None	11.1	50	460	410	55
Do	do	do	11.4	52	477	425	53
Tar	do		10.7		536		45
Do	do		10.7		528		46
Do	do		11.7		528		49
Do	Wood barrel	None					55

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Taro weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Pins	Wood box		21.0		581		80
Rolling, glass	do						109
Rolling, wood	do						140
Steel	Wood barrel	None	4.0		230		39
Pipe	Piece		2.5		120		47
Black	Bundle		2.0		185		24
Cast iron, 24-in. diameter							65
Lead, bent	Wood box						40
Steel	Crate		9.5		104		204
Wood			8.5		176		108
Pipe and tube, brass	Wood box	None	7.4	90	404	314	41
Do	do	do	3.5	40	370	330	21
Do	do	do	5.8	58	265	207	49
Pipe coverings, asbestos	do	do	26.1	95	224	129	249
Pipe-cutting tools	do	Wood boxes	3.1	23	161	120	42
Do	do	None	1.0	22	93	71	25
Do	do	Cartons	.3	3	30	27	19
Pipe fittings	Wood barrel						42
Do	Wood box		65.0		1,188		122
Iron	Bundle		17.6		1,174		33
Steel	Piece		5.5		370		33
Do	do		6.9		425		37
Do	do		9.3		700		30
Do	Case		6.4		425		34
Pipe wrenches. (See Wrenches.)							
Pistols, automatic	Wood box	100 boxes	7.1	50	325	240	49
Pitch:							
Brewer's	Drum		10.7		490		49
Coal-tar	Metal drum	None	8.4	16	500	484	38
Hardwood	Drum		9.8		515		43
Lignin	Paper-lined burlap bag	None	4.8	1.5	131.5	130	82
Dry	Bag	do					103
Medium	Drum	do	8.4		501		38
Roofing	Wood box	12 cans, 1 gal. each	3.0	18	144	116	47
Stearine	Wood barrel	None					67
Wood	Can	do	8.0	13	398	385	46
N. o. s	Wood box		2.1		100		48
N. o. s	Drum		9.0		594		34
N. o. s	do		8.7		525		37
N. o. s	do		9.0		519		39
Plants, live	Wood box		9.3		174		119
Do	do		14.0		300		100
Plaster:							
Building	Bag	None					39
Do	Wood barrel	do					53

Wall, prepared	Bag	do					65
N. o. s.	Wood box		6.3		141		100
N. o. s.	Bag	None	1.3		100		29
Plasterboard	Wood crate		14.8		646		52
Do	do		20.3		1,167		56
Do	do		41.8		1,569		60
Do	do		43.8		1,614		61
Do	do		16.0		580		62
Plaster fiber	do		14.0		200		150
Plaster of paris	Fiber carton						52
Do	Wood box						60
Do	Wood barrel		6.0		250		53
Plasters, porous	Fiber carton		6.0		130		105
Plastogen oil	Drum	None					75
Plate, black. (See Black plate.)							
Plates, lead, for battery boxes	Wood box						36
Plates, paper	Fiber carton						260
Do	do		.8		20		89
Playing cards	Case		4.8		228		47
Do	do		5.1		222		50
Do	do		5.1		215		52
Do	Wood box	Cardboard boxes					50
Pliers, steel	do	Cardboard	2.9	20	167	147	39
Do	do		4.3		376		25
Do	do		1.0		49		46
Plow (see also Agricultural machinery)	Case		20.8		805		54
1 complete:							
Plow blade	1 case		38.8				36
Axles, scrapers, and gear shield	do		18.7		870		49
1 beam	Loose		1.6		607		6
6 disks	1 bundle		4.2		367		25
Cast wheels (2)					780		10
			3.3-6.7		394		
Cast wheel (1)			3.6		206		39
Total			73.6				31
1 complete	Case		34.1		1,967		39
Plow parts	do		8.3		340		55
Do	do		7.0		527		30
Plows, snow	Wood box						285
Do	do						234
Plumbing fixtures:[4]							
Vitreous china, 6-gal. tank	Wire-bound crate	None	2.3	9	62	53	83
Vitreous china closet bowl (1)	do	do	2.9	6	41	35	158
(2)	do	do	5.1	14	85	71	135
Wash-down bowls (2)	Wire-bound wood crate	do	4.6	12	74	62	137
Plums	Lug		1.0		27		83
Do	Wood crate		1.0		27		83
Do	Wood box						112
Plywood	do		30.0		1,049		65

[4] For bathtubs, lavatories, sinks, and so on, see specific name.

UNITED STATES EXPORT AND REEXPORT COMMODITIES—*Continued*

Commodity	Outer container	Inner container	Cubic feet	Taro weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Polish:							
Automobile	Fiber carton	12 bottles, 1 pt. each	0.5	2	27	13	39
Metal	Wood box	6 cans, 1 gal. each	1.8	12	64	47	62
Do	do	24 cans, 1 qt. each	1.9	12	65	45	64
Do	do	48 cans, ½ pt. each	1.0	9	41	24	55
Shoe	do		5.0		150		75
Do	do		4.7		151		70
Stove	Wood barrel	None	13.0		695		42
Polishers, floor, electric	Wood box						221
Polishing:							
Composition	Wood barrel	None	8.0		425		40
Compound (lacquer)	Fiber carton		.9		23		89
Wax. (See Wax.)							
Popcorn, shelled	Bag	None					54
Do	Wood barrel	do	10.0		331		67
Popcorn confectionery	Fiber carton	Cardboard boxes					227
Porcelain enamel, crushed or ground	Wood barrel	None					50
Porcelain, laboratory	Wood box		1.2		25		105
Pork (see also specific name):							
Backs	do		6.0		200		45
Canned	Corrugated fiber carton, partitions	8 oblong cans, 6 lb. each	1.1	8	56	48	44
Do	do	6 cans	1.9	12	82	70	52
Do	do	12 cans, 3 lb. each	.9	8	44	36	46
Do	Wood box, partitions	12 round cans, 6 lb. each	2.3	24	96	72	54
Loins, frozen	Wood box	Wrappers and lining	1.6	15	60	55	51
Pickled	Wood barrel	None	8.1	44	[4] 370	200	50
Pickled and salted	Wood box	Salt	13.4	100	700	600	43
Do	do	do	13.0	100	700	600	42
Do	Wood barrel	Pickle	6.6	114	314	200	47
Do	do	do	3.2	59	159	100	45
Portable tools, pneumatic:							
Chipper	Wood box	None	.2	1	14	13	27
Drill	do	do	1.3	13	77	64	37
Do	do	do	1.0	18	45	28	48
Do	do	do	.5	4	20	16	16
Grinder	do	do	.7	5	16	11	94
Riveter	do	do	.3	3	25	22	24
Riveter jam	do	do	.4	4	41	38	23
Sand rammer	do	do	.2	3	24	21	21
Post cards, picture	do						61
Potassium salts and compounds (see also specific name):							
Aluminum sulfate:							
Lump	Wood barrel	None	9.7	25	375	350	57
Powdered	Steel drum, ICC-39B, 50-gal	do	9.0	25	375	350	53

Bichromate	Wood cask	do	14.0	70	870	800	36
Do	Wood barrel	do	7.8	20	500	480	35
Do	do	do					38
Bromate	Wood box						27
Carbonate	Wood cask	None					35
Do			9.2		449		46
Do			8.7		373		53
Do			9.1		373		54
Do			9.7		401		54
Do			9.7		347		62
Calcined			8.7		401		49
Do			10.8		401		61
Hydrated			9.2		449		46
Do			8.9		423		47
Do			9.7		450		48
Caustic:							
Crushed	Drum		8.4		418		45
Flake	do		8.4		373		51
Liquid	do		14.1		771		41
Solid	do		8.4		698		27
Chlorate	do		2.3		120		43
Cyanide	Steel drum	None	2.8	10	110	100	56
Do	do	do	1.4	6	56	50	55
Iodide	Wood box	Stone jar, 2-gal	1.3	10	47	25	64
Muriate	Bag	None					40
Do	do		3.9		226		39
Do	do		4.6		224		45
Prussiate	Wood barrel	None					67
Prussiate of yellow	Barrel		8.9		395		51
Do	do		9.7		396		55
Do	do		9.3		386		55
Do	do		10.5		396		59
Sulfate	Bag	None					50
Xanthate	Drum		9.3		275		75
Potato chip machinery. (See Slicing machinery.)							
Potato digger parts	Wood box		8.0		403		44
Potato flour. (See Flour.)							
Potato shreds	Bag	None					94
Potatoes	Wood barrel	do	6.7		200		65
Do	do	do	7.0		185		85
Do	Cloth bag	do	3.8	2	156	154	55
Do	do	do	3.5		115		69
Do	Wood crate	do	4.7		163		66
Do	do	do	1.8	7	57	50	70
Do	do	do	3.5		113	[1]	69
Pot cleaners, wire cloth	Wood box						125
Poultry and dairy feed. (See Feed, mixed.)							
Powder. (See specific name.)							
Powder puffs	do						251
Preserves, fruit (see also Fruit, preserved)	Drum	Glass jars					54

[1] Including pickle.

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Press:							
Fruit, hand	Drum						100
Hand	do		11.0		632		40
Printing	Case		26.0		1,577		37
Do	do		26.5		1,362		44
Do	do		72.8		2,437		67
Do	Wood box		45.0		1,745		58
Horizontal	8 wood boxes	None	558.0	3,295	12,090	8,795	103
Horizontal, with motor	18 wood boxes	do	816.0	5,495	24,955	19,460	73
Horizontal, without motor	13 wood boxes	do	582.0	3,895	18,745	14,850	70
Vertical	Wood box	do	129.3	515	3,265	2,750	89
Press cloth	Bales						170
Press packing, rubber and felt	Wood box		2.1		67		70
Pretz sticks	Fiber carton						193
Primers, oil	Wood box	6 cans, 1 gal. each	1.8	12	110	92	37
Do	do	24 cans, 1 qt. each	1.9	12	111	91	37
Printed matter, n. o. s	do		9.0		328		62
Process oil	Drum	None					59
Propeller shafts, marine	Case		.5		24		47
Propylene glycol	Steel drum, ICC-5E	None	11.7	51	551	500	47
Prunes, dried	Wood drum	do	3.5	14	212	198	37
Do	do	do	3.0	9	119	110	56
Do	Wood box	do	1.1	6	61	55	41
Do	do	do	1.3		53		53
Do	do	do	.6	3	28	25	45
Do	do	10 bags, 5 lb. each	1.3	9	59	50	49
Do	do	36 cartons, 1 lb. each	1.0	6	45	36	51
Do	Fiber carton		.6		28		48
Pitted	Wood box	36 cartons, 15 oz. each	.9	6	40	34	49
Prussian blue (see also Colors in oil)	Wood barrel, paper lining	None	14.9	28	328	300	102
Pulleys:							
Steel	Wood crate		16.3		232		157
Tractor	Wood box		4.8		260		42
Wood	do						46
Pulp (see also Wood pulp):							
Sulfate, dry	Bale	None					75
Sulfite	do	do	9.0		400		48
Dry	do	do					60
Pulpboard	Bundle	do	1.9		75		57
Latex-pressed	Case		9.8		369		60
Wood	Bundle		2.7		114		51
Do	do		2.8		110		58
Do	do		2.9		112		59
Do	do		3.0		111		62

Do	Paper-wrapped bales	Wood frames, top and bottom	11.5	22	572	550	45
Do	do	do	13.0	25	575	550	51
Do (rolls)	Paper wrapper	None	27.0	3	710	707	85
N. o. s.	Case		10.0		295		76
Pulpboard boxes, knocked-down	Bundle		2.8		75		85
Pumice stone. (See Stone, pumice.)							
Pumpkin, canned	Wood box	Cans	1.3		52		57
Pump parts	Case		1.0		40		56
Pump shafts	do		3.2		165		43
Pumps (see also specific name):							
Double-stage	Wood box	None	62.0	340	2,340	2,000	60
Gasoline and oil	do						126
Single-stage	do	None	40.8	385	1,085	1,600	46
Two-inch centrifugal	do	do	3.5	35	125	90	63
N. o. s.	Wood crate	do	8.3		770		24
N. o. s.	Wood box		8.0		139		135
Punches, saddlers'	do		1.2		156		17
Putty	Wood cask	None	11.0		712		34
Do	Fiber carton						34
White	Wood box	24 cans, 1 qt. each	1.9	12	153	133	27
Do	do	24 cans, 1 pt. each	.9	8	80	66	26
Pyridine	Steel drum, ICC-5E, 55-gal	None	11.6	53	496	443	52
Do	Drum		11.7		458		57
Pyrophyllite	Bag	None					56
Pyroxylin:							
Film	Case		7.6		272		63
Do	do		7.7		266		65
Plastic	do		9.8		391		56
Do	do		10.0		398		56
Do	do		10.1		404		56
Do	do		10.3		410		56
Do	do		10.3		410		57
Sheets	Wood box		4.5		289		35
Do	do		4.3		247		39
Do	do		6.0		335		40
Do	do		4.3		227		43
Do	do		4.9		176		63
Do	do		4.3		137		71
Do	do		4.0		117		77
Quaker oats	do	Packages					100
Quartz, color	Bag	None					111
Quicksilver. (See Mercury.)							
Quinine	Can		.7		9		175
Rabbit skins:							
Dressed			13.7		205		151
Dry			24.7		526		106
Do			25.7		537		107
Raw			27.3		489		125
Do			24.8		249		223
N. o. s.			28.8		505		129
N. o. s.			17.6		247		163
N. o. s.			29.0		365		178
Radiator cleaner, automobile	Fiber carton	12 cans, 24 oz. each	.5	2	23	18	51

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Radiators	Crate		9.4		598		35
Do	do		5.9		333		40
Automobile	Case		15.8		254		139
Do	do		18.3		422		97
Thresher	Crate		7.0		114		137
Radio:							
Loudspeakers	Case		2.2		39		127
Do	do		6.8		132		116
Do	do		3.9		77		113
Do	do		14.6		206		159
Do	do		13.1		176		166
Parts	do		5.7		201		63
Do	do		7.0		97		161
Do	Carton		.9		10		205
Do	do		.9		25		82
Do	Wood box		20.0		389		117
Do	Fiber carton		4.0		113		75
Transformers. (See Transformers.)							
Tubes	Carton		1.6		15		236
Radios	Case		2.5		43		130
Do	do		2.8		48		131
Do	do		10.1		160		207
Do	do		5.7		82		155
Do	do		16.6		148		249
Do	do		11.4		111		331
Do	do		11.7		135		194
Do	do		10.8		104		233
Do	do		14.4		275		117
Do	do		6.1		121		113
Do	do		10.3		145		159
Do	do		18.3		222		185
Do	do		14.5		175		187
Do	do		5.4		156		78
Do	do		2.7		40		154
Do	do		4.8		57		188
Do	do		15.8		170		206
Do	do		9.4		88		240
Do	do		8.3		84		219
Do	Carton		12.0		155		174
Do	do		3.5		37		212
Do	do		5.9		76		175
Do	do		2.6		36		161
Do	do		18.7		168		251
Do	do		6.3		77		181
Do	do		1.7		20		187

Do	do		2.9		41		159
Do	Box		3.0		68		103
Do	do		12.2		165		165
Do	do		6.7		86		175
Do	do		19.2		197		218
Do	do		37.8		354		239
Do	do		46.7		423		247
Do	do		34.2		307		249
Antennae	Carton		3.2		13		545
Do	do		.8		3		622
Armchair (12)	Plywood box	Packing material	30.5	40	328	240	204
Automobile	Carton		1.4		42		75
Do	do		2.4		58		93
Do	Case		7.7		72		240
Chassis	Carton		2.3		98		53
Do	Case		1.2		18		145
Console	Plywood box	Packing material	16.7	28	160	124	224
Do	do	do	13.3	40	98	46	320
Table (18)	Fiber carton	Separators	23.4	104	320	180	160
Rags	Bale		14.3		457		70
Do	do		46.0		1,023		101
Do	do		27.8		533		117
Do	do		40.1		759		118
Do	do		55.8		995		126
Do	do		13.7		240		130
Do	do		48.8		807		135
Do	do		52.0		827		139
Do	do		52.0		812		144
Do	do		45.0		662		152
Do	do		45.8		658		157
Do	do		59.6		838		160
Do	do		50.4		687		163
Do	do		50.0		970		115
Do	do		51.0		967		120
Do	do		70.0		914		170
Do	do		47.0		1,007		105
Do	do		59.0		1,139		115
Compressed	do		53.0		986		120
Do	do		33.0		924		80
Do	do		53.0		1,011		118
Do	do		40.0		524		170
Cotton	do		54.0		1,018		118
Woolen	do		13.2		342		86
	do		57.0		1,035		123
Rails, railway							12
Rails, steel							15
Raisins:							
Cluster	Wood box	20 cartons, 16 oz. each	.7	4	24	20	64
Turkish	do	None	.7	4	29	25	55
Do	Fiber carton	do	.7	3	28	25	56
Do	Wood box	48 cartons and liners	1.4	7	54	45	57
Do	Fiber carton	do	1.2	3	50	45	55

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UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Raisins—Continued.							
N. o. s.	Wood box		1.0		56		53
N. o. s.	do		1.4		50		63
Rakes:							
Garden, 20 doz	do	None	40.6	160	890	730	102
Garden, 1 doz	Bundle	do	5.5	2	42	40	260
Do	do	do	5.7	2	36	34	373
Road, 1 doz	do	do	5.7	2	57	55	224
N. o. s.	Wood box						135
Ranges (see also specific name):							
Coal or wood:							
Range	1 case		23.8		570		93
Parts	do		9.3		110		188
Total			33.1		680		109
Electric	Case		44.9		460		220
Console model	Wood box	Packing material	36.3	110	385	251	211
Do	do	do	36.3	110	267	233	224
Leg model	do	do	30.8	56	335	169	297
Do	do	do	24.7	85	307	200	180
Oil, 1 complete:							
Range	1 case		78.3		1,700		102
Parts	1 crate		4.0		516		17
Do	do		6.3		138		102
Total			88.5		2,354		84
Oil-burning	Wood crate	None	54.2	141	315	174	385
Do	do	do	34.6	66	203	137	382
Do	do	do	10.4	25	74	49	314
Do	do	do	6.6	20	49	29	304
Do	do	do	26.9	39	123	84	490
Do	do	do	34.0	54	170	116	448
Do	do	do	35.7	59	228	169	350
Do	do	do	28.3	43	172	129	367
Do	do	do	25.2	43	127	84	448
Raspberries, canned	Wood box	6 cans, No. 10	1.2	9	54	41	50
Do	do	24 cans, No. 3	1.6	11	70	53	52
Do	do	24 cans, No. 2	1.0	8	43	30	52
Rayon goods. (See Textiles.)							
Rayon, waste	Slat bale	None	16.0	24	524	500	68
Do	Cloth bale	do	15.1	3	163	160	204
Razor blades, safety	Fiber carton	Packages	.7		26		57
Razors, electric. (See Electric shavers.)							
Razors, safety	Case		10.4		380		59
Reamers	Wood box	Paper wrappers	2.2	25	175	150	28
Do	do	do	2.2	25	200	175	24
cord blanks. (See Dictaphone record blanks.)							

Recording devices	do		7.0		178		90
Records, phonograph	do		6.5		105		64
Scrap	do						72
Red oil. (See Acid, oleic.)							
Reels. (See Kodascope.)							
Reels, wire rope, wooden, empty	Loose						378
Refrigerating machinery:							
Compressor, ammonia	Skids	None	196.0	775	5,915	5,140	80
Do	Wood box		11.8		225		119
Condensor, ammonia, 50" x 16', 290-ton capacity	Skids	None	621.0	1,300	22,600	21,300	62
Refrigerator:							
Cabinets	Case		24.8		290		191
Do	do		27.7		307		203
Do	do		36.4		377		215
Electric (4)	Plywood box	Packing material	35.0	123	370	232	204
Electric (2)	do	do	32.3	108	307	186	224
Coils	Case		1.3		33		85
Electric units	do		2.2		156		31
Do	do		5.3		113		104
Machinery parts	Wood box		23.9		300		179
Do	do		32.7		620		118
Do	do		3.7		100		82
Do	do		49.0		515		211
Do	do		17.9		160		251
Do	do		19.7		190		231
Do	do		4.3		95		100
Motors, electric	Case		1.4		60		53
Parts, electric	do		1.4		54		59
Refrigerator, electric	Plywood box	Packing material	33.7	71	448	375	172
Do	do	do	18.2	45	293	246	140
Do	Case		72.0		800		202
Do	do		42.1		444		210
Do	do		40.5		570		158
Do	do		43.5		765		126
Do	do		24.3		300		182
Do	do		25.3		270		210
Do	do		27.3		368		164
Do	do		37.2		459		180
Do	do		49.5		447		284
Do	do		22.3		268		185
Do	do		25.4		322		175
6 cu. ft.	Plywood box	None	38.7	112	444	332	204
Refrigerator equipment, electric	Case		37.9		323		262
Do	do		20.2		264		247
Air-conditioning equipment	Wood box		25.0		525		105
Do	do		32.0		565		128
Do	do		17.4		205		132
Do	do		114.7		2,504		104
Do	do		46.7		740		140
Air-conditioning systems, condensing units for	do	None	20.6	130	490	360	94
Do	do	do	14.5	100	385	285	84
Do	do	do	14.3	93	335	242	96
Do	do	do	11.1	91	303	212	84

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Taro weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Rennet extract, liquid	Cask	None	9.0		475		45
Reogen oil	Drum	do					62
Resin	Steel drum	do	11.2	15	500	485	50
Do	Wood barrel	do	11.5	70	500	430	52
Natural:							
Accroides	Cloth bag	do	4.5	2	150	148	67
Batu, and Black East India	do	do	6.7	5	165	160	91
Congo	do	do	3.2	2	113	111	63
Damar	Wood box	do	4.3	29	165	136	58
Kauri	do	do	8.9	50	300	250	67
Do	Cloth bag	do	5.3	5	215	210	55
Manila, Boea, and Loba	Fiber carton	do	7.8	12	185	173	95
Do	Cloth bag	do	8.7	5	165	160	118
Sandarac	Wood cask	do	16.9	66	346	280	109
Synthetic:							
Coal-tar	Drum		9.8		310		71
Do	Barrel		9.2		263		78
N. o. s	Drum	None	5.0		250		47
N. o. s	Wood barrel	do	9.0		351		60
N. o. s	Drum	do	9.7		238		91
N. o. s	Fiber drum		7.7		116		147
N. o. s	do		7.3		110		149
Resin or rosin (see also Rosin)	Barrel		9.2		350		58
Do	Drum		9.8		527		42
Do	do		11.7		576		45
Do	do		11.3		529		481
Do	do		14.1		579		54
Do	do		3.0		107		62
Resorcin	Barrel		13.5		388		78
Revolvers	Wood box	100 boxes	5.3	44	210	146	57
Rhubarb	do		14.0		346		93
Ribbon:							
Inked:							
Adding-machine	do	Cartons	4.4	28	62	32	160
Typewriter	do	Cartons, spools	9.3	67	435	368	48
Silk	do		2.3		23		224
Rice	Bag	None	2.0		101		65
Do	do	do	4.3		193		50
Bran	do	do					128
Krispies	Fiber carton	Packages	1.0		12		265
Rice-milling machinery:							
Bran reel	Wood box	None	215.0	750	2,550	1,800	188
Do	do	do	541.0	1,375	4,575	3,200	263
Brush	do	do	28.0	240	600	300	105
Do	do	do	45.0	300	750	450	135

Cylinders	do	do	118.0	800	2,300	1,500	115
Do	do	do	175.0	975	2,850	1,875	137
Grading reel	do	do	527.0	200	3,500	3,300	339
Do	do	do	600.0	200	3,700	3,500	361
Huller	do	do	112.0	350	3,200	2,850	77
Do	do	do	57.0	295	1,390	1,095	92
Huller and polisher	do	do	30.0	210	890	680	75
Huller and polisher, with pan	do	do	47.0	320	1,010	690	104
Trumble or glazing drum	do	do	341.0	565	5,045	4,480	151
Do	do	do	688.0	510	7,100	6,590	217
Rifles, 22-caliber	do	10 boxes	3.3	25	102	57	72
Do	Fiber carton	10 cartons	2.8	7	72	48	86
Rivets (see also specific name)	Box						17
Do	Keg	None	3.0		208		37
Road graders	Wood box	do	543.0	2,250	12,200	9,950	102
Do	do	do	347.0	2,200	9,020	6,820	86
Road rollers:							
15-ton	2 wood boxes, 4 bundles	do	1,036.0	4,000	39,200	35,200	59
10-ton	Wood box	do	628.0	3,100	24,780	21,680	57
6-ton	do	do	361.0	3,300	15,800	12,500	51
Road scraper. (See Scraper.)							
Rochelle salts	Wood barrel, paper liner	do	6.6	26	250	224	59
Do	do	do	3.4	13	125	112	60
Rock wool	Corrugated fiber carton	do	6.0	3.5	33.5	30	400
Do	Carton		28.2		119		529
Do	Paper bag	None	2.9	1	31	30	209
Do	do	do	2.9	1	36	35	181
Do	Fiber carton		22.0		104		470
Granulated	Paper bag	None	4.7	1	36	35	291
Loose	do	do	4.7	1	36	35	291
Metal-reinforced	Wire-bound wood crate	Corrugated fiberboard	20.0	67	400	333	112
Rock wool batts	Corrugated fiber carton	None	5.3	2	25	23	477
Do	do	do	6.7	3	33	30	457
Rolled oats. (See Oats, rolled.)							
Rollers, shade. (See Shade.)							
Rolls, perforated, for pianos	Wood box						143
Roofing (see also specific name):							
Asphalt, roll	Paper wrapper	None	1.3	1	55	54	55
Do	do						50
Galvanized iron	Wood crate						30
Pitch. (See Pitch.)							
Roots, n. o. s	Bale	None	24.0		227		240
Do	Package	do	17.0		198		198
Rope:							
Asbestos	Fiber carton	Carton	2.2	3	56	50	90
Do	do	do	1.3	2	29	25	97
Cotton	Wood box		9.0		210		96
Hemp, Manila	Coil		1.7		64		60
Do	do		14.4		375		86
Steel, galvanized wire	Reel		17.3		1,887		20
Do	do		18.0		1,871		22

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Rope—Continued.							
Wire	Reel		48.5		5,038		22
Do	do		30.8		1,771		39
Do	do						32
Do	do		2.5		162		35
Do	do		14.0		390		80
Rosewood	Wood box		8.0		318		55
Rosin (see also Resin or rosin):							
Gum	Wood barrel	None	12.0		498		54
Oil	Drum	do	12.0		514		52
Wood	Wood barrel	do	12.0		530		51
Rubber, accelerator for. (See Accelerator.)							
Rubber:							
Chlorinated	Fiber drum	do	8.3	20	120	100	155
Do	Fiber carton	do	4.6	10	110	100	94
Do	Drum	do	7.0		121		128
Do	Fiber carton	do	5.4		103		118
Compound	Drum	do	8.0		274		70
Crude	Wood box		2.6		115		50
Reclaimed	Bag		1.8		155		29
Do	do		3.0		162		41
Do	do		2.4		129		42
Do	do		5.2		268		42
Do	do		3.2		164		43
Do	do		3.5		159		49
Do	do		4.0		162		55
Do	Bale		10.3		618		37
Do	do		8.2		470		39
Do	do		4.6		207		50
Do	Carton		4.8		368		29
Scrap. (See Scrap.)							
Substitute. (See specific name.)							
Rubber products (see also specific product):							
Balloons	Wood box						177
Balls, toy	Fiber carton		6.1		112		122
Bands	do		3.5		60		131
Do	Wood box						140
Belting	do		15.8		221		160
Do	do		3.7		192		43
Do	do						48
Do	do		19.0		605		61
Do	Wood crate		24.6		1,086		51
Transmission	Burlap bale	Paper	7.0	11	341	330	46
Do	Wood crate	do	10.2	50	454	404	50

Belt straps	Wood box		2.8		185		34
Do	do		2.9		170		39
Do	do		6.3		345		40
Belts:							
Conveyor	Wood crate	Paper	33.2	159	1,660	1,510	45
Farm	Burlap bale	do	1.6	1	57	56	63
V (10)	do	do	.4	1	8	7	112
Do	do	do	.3	1	5	4	132
Boots	Wood box		18.1		430		146
Flooring	Burlap bale	Corrugated paper	5.5	14	335	321	37
Footwear (see also Overshoes)	Wood box		3.0		65		103
Do	do		2.8		44		143
Do	do		2.7		41		145
Do	do		3.7		45		182
Goods, n. o. s.	Fiber carton		.6		7		187
Do	do		8.7		95		205
Heels:							
Half	Plywood box	Paper	1.4	6	73	67	43
Do	do	do	1.4	6	78	72	40
Men's:							
100 pairs	Wood box	None	1.1	7	42	35	57
72 pairs	do	do	1.3	9	34	25	83
Whole	Plywood box	Carton	1.2	6	49	43	55
Do	do	do	1.2	6	54	48	49
Men's, 100 pairs	Wood box	None	1.5	11	61	50	56
N. o. s.	Bale	do					120
Heels and soles	Wood box		3.7		166		50
Do	do		5.0		73		152
Matting	Burlap	Paper	8.3	6	556	550	33
Packing. (See Packing.)							
Sheet packing	Burlap bale	do	1.4	3	114	111	28
Do	Wood box		4.0		230		39
Sheets	Bale	None	2.0		58		77
Soles	Wood box						39
Black	Plywood box	Carton	1.4	7	61	54	51
Crepe	Wood box						64
Tan	Plywood box	Carton	1.4	7	64	57	49
Soling strips:							
Black	do	Paper	4.1	18	311	293	29
Tan	do	do	4.1	18	370	352	25
Sundries, n. o. s.	Fiber carton		3.7		49		168
Taps	Wood box		4.1		158		58
Do	Fiber carton		1.2		56		47
Tire fabric	Roll	None	21.3		644		74
Toplift strips:							
Black	Plywood box	Paper	4.1	18	305	287	30
Tan	do	do	4.1	18	364	346	25
Rubberized cotton goods	Case		10.9		400		61
Rubbing compound (lacquer)	Drum		1.1		56		43
Rugs (see also *Floor* coverings):							
Fiber, paper	Cloth roll	do	9.2	9	115	106	172
Grass (4), 9′ x 12′	do	do	9.2	8	124	116	160
Machine-made, 9′ x 12′	do	do	4.1	6	44	38	204

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Rum	Wood barrel	None	12.6	81	441	360	64
Do	do	do	9.0		450		48
Do	Wood cask	do	33.0		1,122		65
Do	Wood box	Bottles	1.5		48		70
Do	Hogshead	None	47.0		1,350		77
Do	do	do	30.3		1,200		56
Rye	Bag	do					55
Do	Bulk						50
Feed	Bag	None	5.5		162		76
Saccharine	Wood box		4.7		101		107
Do	do		3.3		104		70
Sacks, ore	Bale	None	4.9		101		110
Saddlery	Wood box		3.0		75		90
Do	do		28.7		350		184
Safes:							
Cabinet	do	None	72.0	255	2,130	1,875	76
Do	do	do	11.7	200	1,360	1,160	19
Do	do	do	59.4	235	1,460	1,225	91
Steel	do	do	23.0		616		83
Do	do	do	42.4		1,405		68
Safranine, basic. (See Coal-tar colors.)							
Sago (see also Flour)	Bag	do	4.0		178		50
Pearls	do	do	4.8		184		59
Sailcloth	Bale	do	6.7		213		70
Sails, canvas	do	do	15.0		123		273
Salad oil	Wood box	Tins	1.3		88		32
Do	do	do	1.6		55		66
Salammoniac	Wood barrel	None					72
Salmon	Kit	do	1.8		66		61
Canned	Wood box	48 cans, No. 1, tall	1.6	8	68	52	51
Do	do	48 cans, No. ½, flat	.9	5	36	25	53
Salmon and halibut, frozen	do	None	8.2	32	232	200	80
Do	do	do	5.0	18	118	100	93
Salt	do	Packages	1.0		51		44
Common	Bag	None	1.5		100		33
Do	Wood barrel	do	7.3		295		56
Do	Bag	do	2.2		140		34
Salts (see also specific name):							
Epsom	Wood barrel	do	10.3		325		78
Do	Keg	do	3.3		125		59
Magnesium sulfate	Cloth bag	do	4.6	2	223	221	46
Do	Bag		1.9		101		43
Do	do		2.2		101		48
Do	do		2.3		102		40
Mixed	Drum	None	9.0		327		63

Sand:							
Abrasive	Keg	do					37
Asbestos	Bag	do					23
Filtering	do	do					30
Iron	do	do					11
Processed softener	do		2.2		77		63
N. o. s.	do		2.1		157		30
Sand filter	do		.9		83		26
Sandarac gum. (See Resins, natural.)							
Sandpaper (see also Emery)	Crate		1.7		107		37
Do	do		1.8		96		44
Do	Bundle		2.9		155		43
Do	Barrel		3.8		190		47
Sanitary pads	Carton		4.7		30		355
Do	do		5.2		27		433
Do	do		5.4		28		436
Do	Wood box						415
Do	Fiber carton						387
Kotex	do	Cardboard boxes	5.0		26		407
Sardines, canned	Wood box	48 cans, No. 1, oval	1.3	7	65	47	46
Do	Fiber carton	Cans	1.3		60		47
Do	do	do	1.2		60		46
Sassafras oil	Wood box	2 cans, 25 lb. each	1.5	12	62	50	54
Sauerkraut	Wood keg	None	2.5		89		63
Do	Wood half barrel	do	5.8		250		52
Canned	Wood box	Cans	1.3		50		60
Sausage:							
Canned	Corrugated fiber carton, partitions	6 round cans brine, 6 lb. each	1.0	17.5	41.5	24	54
Do	Corrugated fiber carton	48 cans, 3½ oz. each	.6	.75	21	10.5	64
Do	Wood box	Cans	.3		11		51
Not canned	Solid fiber carton	None	1.7	5	55	50	70
Do	do	do	1.8	4	54	50	75
Do	Wood box	do	1.8	9	59	50	68
Sausage ingredients, salted or cured	do	Salt	1.2	10	60	50	45
Saw blades:							
Hack	do	Packing materials	2.1	33	284	251	17
Hand	do						35
Sawdust, wood	Bag	None					190
Saws	Wood box		2.0		60		75
Cross-cut	Bale	None	1.0		23		97
Hand	Wood box						108
Scales:							
Industrial	Box		31.7		618		115
Weighing	Case		7.8		142		124
Do	do		16.6		390		95
N. o. s.	Wood box		4.5		145		70
Scales and balances	do	None	6.0	45	208	163	65
Scoops, 1 doz	Bundle	do	6.4	2	69	67	204
Scouring compound	Wood box						69

UNITED STATES EXPORT AND REEXPORT COMMODITIES—*Continued*

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Scouring powder	Carton		1.4		51		62
Do	Case		12.6		480		59
Do	do		7.5		276		61
Do	do		15.0		512		65
Do	do		8.0		264		67
Do	do		14.4		445		73
Scrap:							
Bone	Bag						125
Brass	Drum		7.3		838		20
Do	do		8.4		863		22
Do	do		9.7		856		25
Do	do		10.7		907		26
Do	do		9.9		806		27
Do	do		18.9		140		30
Do	Bale	None	43.0		968		100
Do	Barrel		16.2		580		62
Do	do		18.7		588		72
Do	Cask		59.4		1,882		70
Do	Hogshead		60.9		1,801		73
Celluloid	Case						136
Electric storage battery	Drum						34
Do	Loose						20
Leather (see also Leather scrap)	Bag						222
Do	Bale						129
Metal	do	None	43.0		1,099		88
Do	Wood barrel	do	10.0		418		55
Do	Drum	do	8.0		1,016		17
Metals, nickel-bearing	do						75
Monel metal	Bale		9.3		508		41
Rubber	Bag						46
Do	Bale						80
Do	do	None	21.3		925		52
Do	do	do	15.6		656		54
Do	do	do	24.5		967		57
Do	do	do	32.2		1,255		57
Do	do	do	26.4		990		59
Tin-bearing material (see also Tin scrap)	Drum		6.4		823		18
Scraper, road, parts	Pieces		1.8		125		35
Do	Bundle		6.2		380		35
Do	Wood box		16.4		805		45
Screenings, grain, ground	Bag	None					65
Screens:							
For foundry use	Wood crate						487
Motion-picture	Wood box		5.7		117		109
Window	Wood crate						167

Screw drivers	Wood box		2.4		122		44
Do	do		7.1		181		87
Screws:							
Brass	do						30
Iron	Keg	None	3.0		229		27
Do	Case						28
Steel	Wood box		2.0		192		25
Do	do		2.0		162		30
Wood, 1¼" x 8"	do	Cartons	3.3	21	205	170	37
Scythe blades:							
Bush	do	None	.8	8	37	29	50
Grass	do	do	1.8	11	35	24	118
Weed	do	do	1.5	12	39	27	86
Sea-shell waste	do		5.1		288		40
Sea shells	do		14.8		435		76
Do	Bag	None	4.4		139		70
Do	Wood barrel	do	8.5		172		110
Do	do	do	8.0		230		78
Seat covers, automobile	Wood box		14.8		122		273
Seats, chair, wood	Wood crate		5.9		182		72
Do	do		7.7		276		62
Seaweed	Bale	None					240
Seed (see also specific product):							
Alfalfa	do						75
Alsike	Bag		3.5		150		52
Beet	do						198
Blue grass	do		5.4		112		108
Do	do		5.7		112		115
Do	do		5.7		100		129
Do	do						175
Clover	do		3.6		151		53
Do	do		3.8		158		55
Do	do		4.2		164		57
Do	do		3.9		151		58
Do	do						50
Cocksfoot	do		6.7		112		133
Do	do		7.3		112		147
Do	do		9.7		112		196
Do	do		11.7		112		238
Flower, n. o. s.	do	None	3.0		127		57
Garden, n. o. s.	Wood box	Packages	5.6		152		82
Meadow fescule	Bag		4.3		112		87
Mustard	do						87
Orchard grass	do		7.4		112		148
Do	do		7.8		112		157
Do	do		8.3		112		165
Rape	do						60
Red top	do		2.8		100		63
Do	do		3.7		98		86
Do	do		3.8		95		90
Squash	do						78

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Seed (see also specific product)—Continued.							
Timothy	Bag						65
Do	do		2.8		130		49
Do	do		3.2		131		54
Do	do		3.2		125		57
Do	do		3.6		98		82
Do	do		4.9		133		83
Separator, spiral coil	Wood crate						180
Separators, cream	Wood box						92
Sewing-machine needles. (See Needles.)							
Sewing machines. (See Machines.)							
Shad roe	do		.9		37		55
Shade rollers	Case		9.9		236		95
Do	do		4.4		108		96
Do	Carton		1.3		31		92
Do	do		1.7		40		120
Do	do		1.3		27		104
Do	do		1.6		33		105
Do	do		1.7		36		109
Do	Wood box						75
Shades. (See Desk-light shades; Glassware; Lamp shades.)							
Shaft couplings	do		3.3		428		17
Do	do		12.7		1,600		18
Shampoo	Carton		1.3		34		83
Do	do		.7		25		67
Shanks, shoe	Bag	None					189
Shasta water	Wood box	Bottles	3.0		150		45
Shaving cream	Carton		.4		9		100
Do	Case		9.1		198		103
Shears:							
Household	Wood box		4.7		360		29
Do	do		7.3		280		59
Pruning	do		2.1		165		28
Sheets (see also specific name):							
Cotton	do	None	17.1	95	545	450	70
Do	do		8.1		160		113
Do	Bale	None	9.5		343		62
Printed	Wood box		9.0		258		82

Sheeting, bleached, 81″ wide	Plywood box	None	15.9	36	456	420	78
Sheeting, bleached, cotton	Wood box	do	18.3	96	546	450	75
Shellac	do		2.0		80		56
Dry	Bag	None					40
Shells, ammunition:							
Battery	Fiber carton		3.0		54		125
Shotgun, 12-gauge	Wood box	20 boxes, 25 shells each	.8	4	56	48	30
Shotgun, 16-gauge	do	do	.7	4	52	45	28
Shingles:							
Asphalt	2 wood boards and wire	None	2.1	4	80	76	58
Dried	Bundle	do	3.3		50		148
Green	do	do	3.3		45		162
Roofing	do		1.9		100		43
Wooden	do						169
250's	do	None	2.5		80		70
Shirts:							
Cotton	Wood box	Cardboard boxes	25.7	105	250	145	87
Do	do		16.3		166		220
Do	do		28.0		236		265
Sport	do	Cardboard boxes	21.8	100	275	175	178
Shock absorbers	do		8.3		201		91
Shock-absorber oil	Drum	None	3.0		43		156
Shoe eyelets:							
Brass	Wood box		6.5		237		62
Do	do		5.0		188		60
Steel	Wood crate		8.4		308		61
Shoe stain	Wood barrel	None	12.0		600		45
Shoes:							
Boys'	Plywood box	Cardboard boxes	12.8	40	150	110	191
Canvas	Fiber carton	Cartons	3.2	3	45	36	160
Children's	Plywood box	Cardboard boxes	7.2	34	75	41	215
Infants'	do	do	6.9	30	60	30	257
Leather	Carton		5.2		50		229
Do	do		4.3		36		208
Boys'	Fiber carton	12 boxes, 1 pair each	2.7	3	23	16	249
Men's	Wood box	60 boxes, 1 pair each	15.8	61	219	135	160
Do	do	24 boxes, 1 pair each	5.8	19	82	54	160
Do	Plywood box	2 units, 24 pairs each	12.7	43	163	93	172
Women's	Wood box	60 boxes, 1 pair each	10.9	58	152	75	160
Do	do	36 boxes, 1 pair each	6.7	23	80	45	187
Do	Fiber carton	12 boxes, 1 pair each	1.7	3	21	12	187
Misses'	Plywood box	Cardboard boxes	9.6	36	115	79	187
Women's	do	do	15.6	62	180	118	195
Youth's	do	do	12.1	44	142	98	191
N. o. s.	Case		10.8		126		193
N. o. s.	do		11.3		132		193
N. c. s.	Carton		3.3		38		196
Shoes and boots, men's	Plywood box	Cardboard boxes	19.3	69	215	146	116
Shooks. (See Barrel; Box.)							
Shortening (see also Lard)	Oblong tin can	None	.7	2	32	30	49

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Shot	Wood box		.8		129		14
Do							10
Do	Wood keg	None	3.0		552		12
Nickel	do	do	3.3	27	477	450	15
Do	Wood box	do	.1	2.5	27.5	25	8
Do	do	do	.2	4	54	50	8
Do	do	do	.3	6	106	100	6
Do	do	do	3.4	27	502	475	15
Do	do	do	.3	6	106	100	5
Do	do	do	.2	4	54	50	9
Do	do	do	.1	3	28	25	9
Shotguns (10)	do	10 cartons, 1 each	4.7	33	120	67	87
Shotguns, 30-in. barrel, (10)	do	do	3.4	20	111	75	69
Shoulders, dry-salt	Plywood box	Paper lining	14.4	47	[4] 675	605	48
Shovels	Bundle	None	2.0		65		70
1 doz	do	do	5.5	2	59	57	204
Hand	do	do					133
Shrimp:							
Canned, dry-pack	Wood box	24 cans, No. 1½	.8	6	23	12	77
Do	do	48 cans, No. 1	1.0	6	28	15	80
Canned, wet-pack	do	24 cans, No. 1½	.8	5	37	15	50
Do	do	48 cans	1.0	6	46	17	49
Do	Fiber carton	24 jars, 4 oz. each	.7	4	20	6	77
Dry	Bag	None	5.8		147		88
Do	do	do	10.3		268		86
Shrimp fertilizer	do	do	11.0		230		106
Shrimp shells	do	do	14.5		278		116
Signs, glass and metal	Wood box		.7		10		149
Silica	Bag	None					35
Silicon carbide	do		1.4		114		28
Do	Keg		5.3		333		36
Do	do		5.0		219		51
Silicon dioxide	Barrel		7.7		223		77
Silicum carbide	Wood barrel	None					38
Silk (see also specific product):							
Noils	Bale		39.4		331		267
Raw	do		6.0		133		97
Do	do		6.0		140		95
Do	do		6.0		133		93
Do	do		6.0		143		95
Do	do		6.0		138		93
Do	do		5.5		140		88
Waste	Cloth bale	None	16.0	22	422	400	86
Do	do	do					105
Do	do	do					200

Silk goods. (See Textiles.)							
Silver	Bar		1.0		70		10
Do	do		1.0		75		10
Sinks:							
(2)	2 wood crates, bundled	None	20.3	115	465	350	98
Cast iron (3)	Wood crate	do	5.6	40	202	162	62
Cast iron, with back	do	do	10.8	40	149	109	162
(2)	do	do	15.2	80	298	218	114
Kitchen, enameled iron, 42-in	do	Packing material	13.0	72	175	103	160
Sisal (see also Twine)	Bale	None					180
Sizing, cold water, dry	Wood box						84
Sizing, paper	Wood barrel	None	9.2		350		60
Skates, roller	Wood box		4.5		150		70
Do	do		11.0		328		75
Skelp, steel							10
Skewers, wooden	Wood box						82
Skins (see also specific product):							
Pickled	Wood tierce	None					47
Raw fur	Bale		17.0		250		150
Seal, green, salted	Wood cask	None					46
Sheep	Bale		32.0		226		317
Do	do		35.0		906		87
Do	do		28.0		234		265
Clipped	do	None					246
Raw, untanned, with wool on	do	do					110
Skoot-mobiles	Wood crate	do					354
Slag, furnace	Bag	do	1.0		67		33
Slag, tin furnace	Can	do					29
Slate	Block		1.0		170		14
Crushed	Bag	None	3.0		258		26
Do	do	do					32
Slate roofing	Wood crate	do					18
Sleds	do						350
Sleepers:							
Hardwood							50
Iron							37
Steel							38
Do							22
Slicing machinery:							
Bread:							
Electric	Wood box	None	19.0	110	314	204	137
Do	do	do	13.0	67	192	125	146
21-in. power feed	do	do	92.0		2,000		103
21-in. gravity feed	do	do	32.0		625		115
Hand-operated	do	do	11.0	55	135	80	175
Meat	do	do	6.3	42	124	83	114
Electric:							
Bench type, 7-lb. capacity	do	do	7.3	40	230	190	71
Pedestal type, 12-lb. capacity	do	do	32.5	100	465	365	156
Pedestal type, 20-lb. capacity	do	do	54.0	170	850	680	142

* Including salt.

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Slicing machinery—Continued.							
Potato-chip, electric:							
25 bu. per hr. (capacity)	Wood Box	None	43.8	150	500	350	196
20 bu. per hr. (capacity)	do	do	35.6	101	385	284	207
Vegetable and fruit, electric	do	do	5.4	35	140	105	86
Slippers	Fiber carton		5.0		35		320
Household	Wood box						219
Snuff	do		2.0		50		90
Soap:							
Cakes	Fiber carton	None	1.1	1	60	50	41
Do	Wood box		1.6		101		36
Chips and flakes	Fiber carton	8 pkgs., 5 lb. each	2.8	2	46	40	140
Fancy	Wood box		6.5		240		60
Do	do		2.7		75		75
Do	do		8.3		262		71
Do	do		9.4		270		78
Laundry	do		1.2		70		37
Do	do		1.3		70		43
Do	do		1.3		67		45
Liquid	Steel drum	None	9.3	55	505	450	41
Do	do	do	11.0		567		42
Powders (see also Powder)	Fiber carton	60 pkgs., 12¾ oz. each	2.0	2	54	48	80
Do	Wood box	Packages					62
N. o. s.	Wood barrel	None	2.4		100		54
N. o. s.	Wood box		2.1		57		81
N. o. s.	do						53
Salt water	do		1.5		80		42
Shaving	do		7.0		225		69
Sticks	do		6.1		201		63
Toilet	do		7.1		190		83
Do	do		10.5		244		96
Do	do		14.3		430		74
Do	do		.7		50		65
Do	do						75
Do	Wood crate		7.0		400		50
Do	do	4 wood boxes	5.7		200		64
Do	do		12.0		360		75
N. o. s.	Wood box		1.1		60		41
N. o. s.	do		1.0		49		46
Soap filler	Bag	None	8.0		250		71
Socks, cotton	Fiber carton		1.5		22		150
Socks, knitted	Wood box		4.6		100		102
Soda:							
Caustic	Carton		1.0		48		47
Do	Drum	None	8.0		695		27
Do	do	do	8.6		794		24

Do	do	do	8.7		774		24
Do	Wood barrel	do	12.0		610		45
Do	Drum	do	8.7		785		24
Do	Wood box						98
Do	Drum	None					26
Flakes	do	do	8.2		418		44
Sal	Bag	do	4.5		158		64
Soda ash	Barrel		8.8		382		52
Do	do		5.3		185		54
Do	do		6.8		285		54
Do	Drum		9.6		290		74
Do	do		3.6		100		80
Soda water	Wood barrel	Bottles	7.0		210		75
Sodiums:							
Acetate	Drum	None	8.9		316		63
Do	Wood barrel	do					68
Bicarbonate	Wood box		3.3		165		45
Do	Wood keg	None	2.6		120		48
Bichromate	Cask		12.7		796		36
Do	do		13.7		759		40
Do	Barrel		11.2		635		40
Do	Wood cask	None	14.0	70	750	680	42
Do	Wood barrel	do	7.8	20	400	380	44
Do	Wood cask	do	14.8	70	770	700	43
Do	do	do	14.0	70	750	680	41
Bifluoride	Wood barrel, paper liner	do	9.7	25	375	350	57
Bisulfite	Drum	do	3.8		230		37
Carbonate	Wood barrel	do	9.6	26	326	300	66
Do	Cloth bag	do	8.9	2	152	150	132
Anhydrous, dense	Wood barrel	do	9.8	23	423	400	52
Anhydrous, light	do	do	9.8	23	323	300	68
Monohydrated	Wood box	2 fiber drums, 100 lb. each	9.2	40	260	200	80
Chlorate	Keg	None					58
Chromate	Wood cask	do	14.0	70	870	800	36
Cyanide	Drum		3.0		110		61
Do	do		3.8		111		75
Fluorate	Wood barrel	None	10.0		475		45
Fluoride	Barrel		9.7		400		54
Do	Wood barrel, paper liner	None	9.7	25	400	375	55
Dense	do	do	6.7	22	397	375	38
Light	do	do	3.2	14	139	125	51
Hydrosulfite	Drum	do	3.8		237		36
Hydroxide:							
Flake	Steel drum	do	8.4	20	420	400	45
Do	do	do	2.4	6	106	100	51
Do	do	do	1.2	3	53	50	52
Solid	do	do	8.4	18	718	700	26
Hyposulfite	Bag	do					45
Metal	Steel barrel	do	12.3	120	400	280	70
Nitrate	Bag	do					31
Perborate	Wood barrel	do	7.3	25	275	250	60
Do	Steel drum	do	7.6	26	250	224	68

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UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Sodiums—Continued.							
Phosphate (see also Phosphate tri-sodium)	Barrel		9.2		475		43
Do	do		9.2		475		43
Do	Wood barrel, paper liner	None	6.6	26	246	220	60
Do	do	do	7.1		353		45
Do	Wood cask, paper liner	do	3.4	13	123	110	60
Prussiate	Wood barrel	do					58
Prussiate yellow	Barrel		8.5		355		54
Do	do		8.9		368		54
Do	do		9.7		386		56
Do	do		8.0		386		52
Pyrophosphate	do		10.0		477		47
Silica aluminate	do		6.9		362		43
Silicate	Drum		11.6		611		42
Do	Wood barrel	None	13.7		720		43
Sulfate	Drum	do					30
Sulfide	do	do	9.2		715		29
Crystals	Wood barrel	do	14.1	70	470	400	68
Do	do	do	9.5	70	450	380	48
Flake	Steel drum, ICC-6G, 50-gal	do	9.0	23	398	375	51
Do	Steel drum	do	7.7	20	320	300	54
Solid	Steel drum, ICC-6G, 50-gal	do	9.0	23	663	640	31
Do	Steel drum	do	7.7	20	550	530	31
Do	Steel drum, ICC-6G		8.4	22	607	585	31
Sulfite, crystals	Wood barrel	None	7.2	24	349	325	47
Do	Cloth bag	do	3.9	2	202	200	43
Thiosulfate	Wood box	2 fiber drums, 100 lb. each	9.2	40	260	200	80
Solder	do		.5		124		9
Do	do		1.5		150		22
Dross	Bag	None					24
Soles. (See Leather; Rubber.)							
Solvents, commercial	Drum	do	10.7		446		54
Solvonol	Package		4.0		165		53
Sound equipment	Case		58.7		193		681
Do	do		24.1		70		770
Do	do		4.6		62		165
Do	do		25.2		161		350
Do	do		21.8		350		135
Do	do		11.3		142		178
Do	do		7.1		227		69
Soup, canned	Carton	Cans	.8		43		43
Do	do	do	.7		30		47
Soybean:							
Flakes	Bag						67
Meal	Cloth bag	None	2.7	1	101	100	59
Do	Bag						70

Oil	Wood barrel	None	13.1	73	460	387	64
Oil meal	Burlap bag	do	2.7	1	101	100	60
Soybeans	Bag	do	5.0		182		65
Do	do	do					60
Do	Bulk						52
Soy flour	Bag	None	3.7		100		84
Spades, 1 doz	Bundle	do	4.1	2	70	68	132
Spaghetti, canned	Wood box	Cans	.7		34		49
Do	do	do					57
Spare ribs, pickled	Wood tierce	None	12.0	86	575		47
Spark plugs	Wood box		6.0		310		40
Do	Case		5.3		281		42
Do	do		5.3		267		45
Do	do		5.6		276		45
Do	do		6.2		255		53
Do	do		5.3		254		47
Do	do		2.9		144		45
Do	do		5.3		252		48
Spark plug testers	do		9.7		220		99
Spars, dagame	Piece		13.0		491		60
Spearmint oil	Wood box	2 cans, 25-lb. each	1.5	12	62	50	54
Spectacles (see also Optical goods)	do		6.0		105		127
Speedometer heads	do		1.7		45		83
Speedometers	do						46
Spelter (see also Zinc)							10
Sperm oil, crude and refined	Steel drum	None	10.1	43	403	360	56
Spermacetti wax	Fiber carton	50 cakes, 1 lb. each, separators	1.3	2	52	50	55
Do	Wood box		1.5		69		49
Spices (see also specific name)	Fiber carton	Tins	1.4	15	35	20	90
Spiegeleisen							8
Spinach, canned	Wood box	6 cans, No. 10	1.0	7	50	39	46
Do	do	24 cans, No. 2	1.2	6	56	43	48
Do	do	48 cans, No. 1, tall	1.4	7	65	48	47
Do	do	72 cans, 8 oz. each	1.1	6	49	34	50
Spirits	do		2.5		61		92
Do	do		1.4		49		65
Spokes, wagon, wooden	Wood crate	None					65
Sponges:							
Not rubber	Bale	do					270
Do	do	do	6.0		45		295
Rubber	Case		24.3		244		223
Do	Bale		10.0		115		195
Do	do		10.9		90		272
Do	do		11.3		73		348
Spools, wooden	Bag		3.8		105		82
Do	do		6.2		105		132
Do	do		6.7		105		144
Spoons, paper	Fiber carton						260
Sprayer pumps, agricultural	Wood box		8.6		407		47
Spraymaso	Drum	None					26

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Springs:							
Locomotive	Wood box		1.3		110		25
Railroad car	Bundle						18
Steel	Wood box		3.8		350		25
Staples	Box						38
Do	Wood box		5.3		308		38
Do	Bag	None	1.1		112		22
Starch (see also Cornstarch)	Burlap bag	do	3.3	1	141	140	53
Do	Wood box	Packages	1.8		61		67
Do	Bag		3.4		142		54
Do	Barrel		8.1		250		72
Do	Bag		3.0		140		43
Wheat	Wood drum	None	7.5	23	273	250	61
Do	Cloth bag	do	3.8	1	141	140	59
Do	Wood drum	do	3.8	11	136	125	62
Stationery (see also Envelopes; Paper)	Case		11.4		275		93
Do	do		10.8		255		96
Do	do		14.7		324		102
Do	do		11.7		241		109
Do	do		13.0		144		206
Staves (see also Barrel)	Wood crate		20.0		325		138
Do	Bundle	None	1.2		38		71
Headings, finished	do						60
Oak claret					10		75
Stearic acid. (See Acid, stearic.)							
Stearine	Wood tierce	None	15.3		522		66
Do	Wood barrel	do	9.2		333		60
Vegetable	Wood box		2.0		65		55
Stearine pitch. (See Pitch.)							
Steel and iron (see also specific product):							
Angle iron	Pieces		1.6		179		10
Angles	Bundle		1.3		225		13
Balls	Box		.9		108		19
Do	do		1.1		127		19
Grinding	Wood box		1.3		253		12
Grinding, forged	Drum						13
Do	Case						37
Band iron	Wood box		2.1		113		42
Bars	Lifts		1.0		224		10
Do	Bundle		.8		243		6
Do	Case		1.1		243		10
Do	do		.6		110		12
Do	Bundle		.5		112		10
Do	do		1.0		230		10
Do			1.0		78		10

Iron, round	Lifts		4.8		1,072		10
Steel, spade lug	Loose						32
Billets	do						17
Cast iron, n. o. s.	do		1.0		450		5
Filings, iron	Wood box		9.0		576		37
Galvanized iron	Bundle	None	1.0		210		15
Hoops	do						10
Iron	do	None	3.2		175		40
Do	Wood box		5.5		640		19
Do	Coils		1.2		87		30
Pig iron							10
Plates, iron	Pieces		7.3		1,667		9
Plates, steel	Loose		.5		103		7
Do	do		2.8		682		9
Rods	Case		1.6		132		27
Do	do		5.8		395		33
Copper-covered	Loose						50
Rolls, solid, loose or packed, not with machinery	do						13
Sheets	Bundle		.5		111		10
Do	Loose		.3		35		21
Do	Skids	None	20.1	90	6,000	5,910	8
Do	Platform	do	14.8	240	5,500	5,260	6
Do	Bundle	do	9.6	8	4,538	4,530	5
Do	Wood crate	do	8.5	100	1,260	1,160	15
Do	do	do	5.6	44	600	556	21
Do	Wood box	do	2.9	40	550	510	12
Do	Bundle	do	.5	3	170	167	7
Do	Package	do	1.0		217		10
Do	Bundle	do	23.2		5,201		10
Black	do		.9		200		10
Do	Piece		2.4		543		10
Circles	Paper wrapping	None	.4	4	160	156	6
Corrugated	Wood box	do	4.2	75	630	555	15
Do	Bundle	do	1.4	5	169	164	19
Galvanized	do	do	.7		148		10
Do	do	do	.5		111		10
Stainless	Wood box	do	7.3	172	1,180	1,008	14
Do	do	do	6.7	126	630	504	24
Sheets and plates, n. o. s. (not alloy tin plates or tin plate, plain or galvanized)	Crate						16
Spikes	Keg						21
Stainless	Box		4.0		218		45
Do	Case		2.0		521		10
Strips	do		4.2		525		18
Do	do		2.7		330		18
Do	Wood box		2.8		239		26
Do	Coil		1.2		176		16
Do	Bundle		1.0		208		10
Steel wool	Carton		4.2		39		239
Do	Fiber carton	50 tubes, 1 lb. each	6.0	9	65	50	207
Do	do	None	6.0	9	60	50	226
Do	do	do	3.4	6	31	25	246
Do	Carton		2.3		25		209

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Steel wool—Continued	None		7.2		68		236
Do	do		7.2		64		251
Do	do		5.1		34		329
Do	do		3.0		34		220
Do	Wood box		4.0		45		225
Stellite	do						12
Rods	do		1.1		125		19
Stepladders	Wood crate						102
Stocks and dies	Package		5.0		165		65
Stoker drives	Box		10.0		523		42
Stoker parts	Case		7.0		579		30
Do	do		38.0		1,492		55
Stone (see also specific name):							
Crushed	Bag	None					90
Fire, rough-quarried	Loose						11
Pumice	Wood barrel	None					86
Rotten	Bag	do					65
Do	Wood barrel	do					60
Stoves:							
Heating, oil-burning	Wood crate	4 cartons, 1 each	16.3	18	88	54	413
Do	do	None	3.8	9	22	13	389
Do	do	do	2.7	5	15	10	397
Oil-burning	do	do	1.8	14.5	22	7.5	184
Do	do	do	3.0	3	19	16	356
Do	do	do	6.6	16	45	29	330
Do	do	do	8.7	19	55	36	356
Do	do	do	10.8	25	69	44	350
Do	do	do	14.0	32	105	73	299
N. o. s.	Wood box	do	12.0		146		183
N. o. s.	do	do	9.2		75		274
Stove wicks	Wood crate	do	5.4		47		258
Straw	Roll		24.0		636		85
Strawboard	Bale		10.4		175		121
Do	do		16.6		220		173
Do	do		17.3		155		246
Do	Case		7.5		91		185
Do	do		9.1		108		187
Do	do		8.1		91		107
Do	do		9.5		106		201
Do	do		8.9		90		221
Strawbraid	Bale		17.7		103		242
Straws, drinking	Case		8.5		86		223
Do	do		9.4		92		230
Do	do		9.0		86		234
Do	do		9.9		94		236
Do	do		9.2		75		274

Strontium nitrate	Wood barrel, paper liner	None	7.2	24	724	700	22
Styptic pencils	Cartons		.7		39		43
Do	do		1.3		76		39
Sugar (see also specific name):							
Granulated	Wood barrel, paper liner	None	8.3	25	375	350	50
Do	do	12 cloth bags	10.9	25	326	300	75
Do	Cloth bag, cloth liner	None	2.3	1	101	100	51
Powdered	Wood box	Packages	19.0		425		100
Refined	Bag	None					48
Do	Wood barrel	do					54
Do	Wood box	Packages	1.4		60		53
N. o. s.	Wood half barrel	None	4.0		114		78
N. o. s.	Bag	do	5.0		224		50
Sugar of milk	Wood barrel, paper liner	do	7.7	23	223	200	77
Do	Wood barrel	do					63
Suitcases	Wood box		65.4		780		185
Sulfate of iron (copperas)	Drum	None	8.0		399		45
Sulfur (see also Coal-tar colors)	Bulk						31
Do	Wood barrel	None	9.8		462		48
Do	Bag	do	1.8		11 (		35
Do	do	do	3.0		200		32
Do	Wood box		3.5		200		38
Sulfur flowers	Wood barrel	None	7.0		195		50
Sulfuric acid	Carboy	do					59
Sulfuric acid (oil of vitriol)	Steel drum, 110-gal.	do	24.3	180	1,880	1,700	29
Do	Carboy	do	6.4	76	251	175	57
Sunlamps	Carton		9.0		69		292
Surgical:							
Dressing	Case		10.4		310		75
Do	do		5.5		156		79
Gloves. (See Gloves.)							
Sutures	do		6.2		142		97
Suspenders	Wood box		17.0		280		140
Do	do		13.0		225		129
Switches, electric. (See Electric.)							
Syrup (see also specific name):							
Cane	Barrel		13.7		768		40
Do	do		13.7		750		41
N. o. s.	Wood box		4.5		109		92
N. o. s.	Fiber carton		1.0		27		62
Syrup and dried lemon or orange juice	Wood box	50-lb. can	1.8	7	60	50	68
Tabulating cards	Case		3.2		140		51
Tacks:							
Blued cut	Wood box		1.5		130		26
Do	do		1.7		130		30
Cobbling	do		1.4		100		32
Shoe	do		1.2		141		19
Thumb	do		3.4		119		64
Tags, paper	do		17.5		343		114
Do	do		19.8		249		178
Do	do		23.7		201		265

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Talc	Bag		3.6		160		49
Do	do		3.1		160		43
Do	do		2.3		101		52
Do	do		4.1		160		57
Do	do		2.2		80		61
Do	Wood barrel	None	5.7		175		74
Mined, ground, and washed	Cloth bag, paper liner	do	4.0	2	202	200	44
Talcum powder	Case		3.3		130		57
Do	do		3.6		128		63
Do	Bag	None	2.0		111		42
Do	Wood box		10.0		257		90
Talcum and face powder	Fiber carton	144 pkgs., 4 oz. each	1.4	3	61	36	52
Do	Wood box		2.3		72		72
Tallow	Wood barrel	None	13.0		440		66
Do	Wood box		2.0		70		64
Do	Wood tierce	None	12.1	70	470	400	57
Soap	Wood barrel	do	12.0		450		60
Tanbark	Bag	do	3.0		69		97
Tangerines, fresh	Wood box	do	1.0	8	45	37	50
Tank heads	Bundle		8.3		230		80
Tanks:							
Fittings, steel	Lot						185
Wooden, knocked-down	do						64
Tanners' oil, sulfonated	Drum	None					51
Tannic extract	Wood barrel	do	10.0		81		277
Tanning extract:							
Liquid	do	do					25
Powder	Bag	do					60
N. o. s	Wood barrel	do	12.0		600		45
N. o. s	Barrel		7.2		450		36
N. o. s	do		11.9		565		47
N. o. s	do		12.0		448		60
Tape:							
Cotton	Wood box	Separators	5.6	55	195	130	64
Friction	Fiber carton	Cartons	1.1	6	54	41	45
Do	Case		3.0		133		51
Do	do		3.5		137		57
Insulated	Wood box		3.2		180		39
Do	do		5.5		226		55
Tape-sealing machinery (gum)	Case		18.9		531		79
Tapioca (see also Flour)	Cloth bag	None	6.1	3	220	217	45
Do	do	do	2.5		50		110
Do	do	do	3.8	2	152	150	56
Do	do	do	3.0		133		51
Do	Wood box		1.3		25		116
Dextrine. (See Dextrine, tapioca.)							

Tar (see also specific name)	do		2.3		119		44
Do	Wood barrel	None	7.0		300		52
Tar oil	do	do					60
Tartar, cream of. (See Cream of Tartar.)							
Tartar emetic (antimony potassium tartrate)	do	do	11.9	80	580	500	46
Tartaric acid. (See Acid.)							
Tea	Chest						109
Teaseed oil	Drum	None					67
Telephone materials (see also Wire)	Wood box		32.3		526		135
Do	Reel		12.3		120		230
Do	Wood box		11.3		250		100
Tents, shelter							130
Terracers	Case		43.0		1,735		56
Textile machinery (see also Machinery; and specific name):							
Braiding machine	Wood crate	None	295.8	1,571	6,350	4,779	107
Do	Wood box	do	39.1	165	590	425	149
Do	do	do	4.6	45	165	120	62
Carding machine, slasher	do	do	1,140.0	6,850	24,200	17,350	107
Cotton-warping unit, complete	125 wood boxes and crates	do	2,371.0	18,800	56,047	37,247	93
Looms	Wood box	do	126.2	750	2,715	1,965	104
60" wide	do	do	196.5	1,000	4,059	3,059	107
80" wide	do	do	258.5	1,250	5,238	3,988	112
Knitting machines:							
Hosiery, circular	do	do	45.1	252	834	582	121
Do	2 wood boxes	do	27.9	204	708	504	88
Do	Wood box	do	15.6	153	515	362	68
Do	do	do	14.4	135	409	274	79
Hosiery, full-fashioned	do	do	225.1	1,752	10,200	8,448	50
Do	Wood crate	do	50.5	345	1,126	781	102
Do	do	do	45.9	298	1,104	806	93
Do	do	do	13.0	106	276	170	107
24-section, 45-gage footer	7 wood boxes	do	503.3	4,900	21,900	17,000	52
Do	do	do	531.6	5,114	24,664	19,550	48
Underwear fabric	Wood box	do	68.6	208	1,040	832	148
Do	do	do	53.4	372	937	565	128
Spinning frame, 3-in. gage, 300-spindle	do	do	385.0	3,300	13,600	10,300	63
Winding machines:							
Cone:							
100 spindles	do	do	329.2	2,300	9,300	7,000	79
96 spindles	do	do	362.5	2,180	7,680	5,500	106
20 spindles	do	do	48.3	372	1,250	878	87
6 spindles	do	do	31.8	200	660	460	108
Single-coil unit	do	do	16.0	120	340	220	105
Warping, 500 creels	do	do	60.5	600	2,800	2,200	48
Textiles (see also specific product);							
Broadcloth and shirting, cotton, bleached	do	do	30.7	155	785	630	88
Chambrays	do	Paper lining					92
Cottonades	Burlap bale	Waterproof paper and card-board.	25.2	19	646	627	89

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Textiles—Continued.							
Cotton cloth:							
In the grey	Cloth bale	Paper lining	16.7	6	528	522	70
1,000 yd	do	do	7.2	10	262	252	62
Prints	Wood box	do	32.9	89	402	313	187
Cotton crepe	do		14.0		225		139
Cotton piece goods	Burlap bale	Waterproof paper and oilcloth.	20.4	12	512	500	89
Do	Wood box	Waterproof paper	28.8	52	547	495	118
Do	Bale		8.7		310		63
Do	do		8.3		295		63
Do	do		16.2		429		84
Do	do		15.4		410		84
Do	Wood box		11.4		410		62
Do	do		18.2		640		64
Do	do		17.7		547		72
Do	do		11.0		318		78
Do	do		21.7		545		89
Do	do		9.9		234		95
Do	do		8.2		151		121
Do	do		21.3		314		152
Do	Bale		15.6		495		70
Do	do		6.3		143		98
Do	do		8.7		189		105
Do	do		6.7		142		106
Do	do		5.6		114		112
Crinoline, 3,000 yd	Burlap bale	Paper and wood battens	26.0	13	400	387	86
Denim	Roll	None	11.7		336		77
Do	Burlap bale	Waterproof paper and cardboard.	18.4	17	472	455	122
Dress goods, fine (voiles, organdies, lawns, batistes, piques, marquisettes, etc.).	Corrugated fiber carton	None	6.3	7	61	54	231
Do	do	do	3.0	3	30	27	224
Do	do	do	2.3	2	22	20	233
Do	do	do	4.0	3	39	36	231
Do	do	do	2.1	2	20	18	234
Do	do	do	4.4	5	43	38	229
Do	do	do	4.5	3	45	42	224
Do	do	do	3.0	3	27	24	248
Do	do	do	5.7	6	54	48	233
Do	do	do	7.4	7	69	62	240
Do	do	do	10.6	8	100	92	238
Do	do	do	13.2	9	127	118	233
Do	do	do	14.0	9	132	123	238
Do	do	do	15.5	10	145	135	238

Duck, cotton	Bolt		3.2		109		65
Do	do		3.2		103		69
Do	Bale		14.3		572		56
Do	Roll		3.5		125		63
Do	do		13.7		493		63
Do	do		3.6		110		73
Do	do		3.3		100		75
Do	do		3.7		103		79
Do	do	None	9.0		218		93
Do	Wood box						85
Flannel and flannelette	Plywood box	None	60.0	84	399	315	334
Flannels	Wood box	Wrapping and waterproof paper.	43.1	121	352	231	273
Do	Plywood box	None	44.0	61	446	385	222
Cotton	Wood box		20.3		320		140
Do	do		18.7		306		138
Ginghams	do	Paper lining					65
Knit goods	do	Cartons	21.8	100	275	175	178
Printcloth:							
Bleached	do	do	6.4	8	272	264	53
Dyed	do	do	18.3	38	634	596	65
Do	do	do	17.0	36	608	572	63
Printed	do	do	19.0	40	630	590	67
Shirting	do	do	24.4	39	496	457	110
Rayon goods, cotton	do		11.4		171		148
Rayon piece goods	Plywood box	Kraft paper	20.7	54	364	310	127
Remnants, cotton	Burlap bale	Waterproof paper and oilcloth	20.4	12	512	500	89
Do	Wood box	Waterproof paper	28.8	52	547	495	118
Silk piece goods	Package		7.0		146		100
Wool cloth	Wood box		22.0		429		115
Do	do		12.0		276		97
Do	do	None	16.5	80	605	525	61
Piece goods (worsteds)	Plywood box	Kraft	18.3	89	560	471	73
Thermometers:							
Clinical	Wood box		3.8		80		107
Do	do		4.3		108		90
N. o. s.	do		1.1		22		110
N. o. s.	do		2.8		47		135
Thinners:							
Bronzing, liquid	do	6 cans, 1 gal. each	1.8	12	59	42	68
Do	do	24 cans, 1 qt. each	1.9	12	61	41	66
Do	do	48 cans, ½ pt. each	1.0	9	40	23	56
Paint	do	6 cans, 1 gal. each	1.8	12	57	40	70
Thiokol (rubber substitute)	Fiber drum		2.1		106		44
Thorium nitrate	Wood box	10 units of 10 bottles each	6.7	70	260	110	57
Thread:							
Cotton	do		4.0		137		66
Do	do		9.0		300		75
Crochet	do		24.4		269		203
Linen	do	Cartons, 125 spools each	12.0	29	316	75	86
Rubber	do						66

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Thread-cutting machine	Wood box	None	93.0	550	3,300	2,750	63
Do	do	do	301.0	1,850	11,850	10,000	57
Do	do	do	147.1	700	3,800	3,100	87
Threshers. (See Agricultural machinery.)							
Ties, creosoted (each)			3.0		160		42
Ties, steel	Bundle		4.7		284		36
Tile:							
Asphalt or mastic	Wood box	Steel drum	6.5	20	358	308	41
Do	do	do	4.7	20	220	180	48
Do	Wood box, liner	None	1.8	26	128	102	31
Earthen:							
Decorative strips	Fiber carton	Separators	.8	3	43	40	41
Floor	Wood box	None	2.8	22	173	151	36
Do	do	do	1.7	13	150	137	26
Floor	Wood crate	Corrugated cardboard	1.3	8	101	93	29
Wall:							
Flat	do	do	1.3	8	87	79	33
Do	do	do	1.3	8	85	77	34
Trim	do	do	1.3	8	65	57	45
Do	do	do	1.3	8	60	52	48
Paving or quarry	do	Separators	2.3	15	204	188	25
Rubber	Wood box	None	4.0	50	260	210	34
Do	do	do	2.5	20	190	170	29
Tin ashes							30
Tin dross							30
Tinfoil	Case		1.0		157		14
Do	do		1.0		145		15
Do	do		1.3		160		18
Do	do		2.3		151		35
Do	Wood box		3.5		160		49
Tin pigs	Loose		.4		114		8
Tin plate	Box		.7		176		10
Do	do		1.1		235		10
Do	do		1.3		217		13
Do	Skid	None	8.5	35	2,535	2,500	7
Do	Case						8
Tin scrap (see also Scrap)	Bundle	None	7.0		230		68
Do	Bale	do	3.8		280		32
Tin tetrachloride	Steel drum, ICC-5A, 55-gal	do	14.1	145	1,095	950	29
Tinware	Wood box		5.0		118		95

Tire:							
Chains (see also Automobile)	do		15.0		553		60
Fabric, cotton	do						90
Mold. (See Mold.)							
Pumps	Case		13.0		433		66
Repair material	do		13.0		304		95
Tires:							
Iron (6)	Bundle	None	10.0		1,350		17
Rubber:							
Automobile	Loose		2.7		28		220
Do	do		2.4		32		169
Do	do		2.4		30		181
Do	do		3.7		34		242
Do	Bale		11.3		150		170
Do	Case		6.7		104		145
Do	do		7.7		155		112
Passenger car	Wood box	Paper wrapping	29.6	106	473	367	76
Do	Loose	do	2.1	1	20	19	236
Do	Wood box	do	29.6	115	500	395	132
Do	Loose	do	2.3	1	23	22	224
Do	Wood box	do	29.6	106	531	425	124
Do	Loose	do	3.2	1	29	28	248
Truck and bus	do	do	5.0	1	73	72	153
Do	do	do	8.3	1	106	105	175
Do	do	do	12.3	2	155	153	177
Do	do	do	14.7	2	206	204	160
Do	do	do	13.8	4	279	275	112
Titanium:							
Dioxide	Wood barrel	None					51
Oxide	Barrel		9.7		430		50
Pigments	Bag		1.2		51		51
Do	do		1.6		51		70
Do	Barrel		7.4		246		68
Do	do		11.0		325		75
Tobacco (see also specific product):							
Chewing, plug	Wood box	30 wood boxes, 7 lb. each	5.9	38	300	210	44
Cigar filler	Wood barrel	None	15.6	36	150	114	224
Cigar wrapper	Wood box	Burlap and straw matting	10.1	50	230	170	97
Do	Wood crate	Bass, paper	9.4	30	195	160	107
Filler	Bale		2.8		49		149
Leaf	Hogshead		64.0		1,169		123
Do	do		64.0		1,025		140
Do	do		64.0		1,019		141
Do	do		80.5		1,271		142
Do	Case		25.0		557		100
Do	Bale		8.3		145		128
Do	do		7.0		154		100
Do	Wood box		10.0		198		115
Burley	Wood hogshead	None	72.0	160	1,700	1,540	93
Do	do	do	66.7	150	1,150	1,000	132
Maryland	do	do	72.0	150	850	700	190
Ohio	do	do	72.0	150	950	800	170

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Tobacco (see also specific product)—Continued.							
Leaf—Continued.							
Pennsylvania cigar	Wood box	None	18.1	75	375	300	108
Wisconsin cigar	do	do	20.4	80	400	320	114
Manufactured	Case		7.7		190		91
Plug	do		2.7		163		39
Do	do		3.1		179		39
Scrap	Bale		8.0		148		120
Smoking	Wood box	18 units, 24 2-oz. cans each	4.2	23	130	54	72
Do	Fiber cartons	24 units, 12 cans each	2.3	3	63	24	83
Tobacco-cutting machinery	Case		1.1		222		11
Do	do		1.3		290		10
Toilet:							
Cream (see also Cold cream)	Carton		2.3		83		63
Do	Case		2.9		133		49
Do	do		3.9		126		56
Do	do		3.5		126		62
Do	Carton		.5		23		49
Do	do		.9		34		60
Lotion	2 cartons, 1 bundle		.9		36		57
Preparations (see also specific name)	Case		10.6		155		153
Toluol	Steel drum, ICC-5E, 55-gal	None	11.6	53	451	398	57
Do	Drum	do					49
Tomato:							
Catchup. (See Catchup.)							
Juice	Wood box	6 cans, No. 10	1.3	8	52	39	57
Do	do	12 cans, No. 5	1.8	17	60	39	68
Do	Wood case	12 bottles, 26 oz. each	1.9	14	51	21	77
Do	Wood box	36 bottles, 6 oz. each	1.3	8	39	15	72
Do	Fiber carton	Cans	1.0		45		50
Pulp	Wood box	Tins					45
Tomatoes, canned	do	6 cans, No. 10	1.0	7	50	39	46
Do	do	24 cans, No. 2	1.2	6	56	43	47
Do	do	72 cans, 8 oz. each	1.1	6	49	34	50
Do	Carton		1.0		43		51
Do	do		1.1		41		56
Do	do		.8		31		59
Tongues	Wood barrel	None	7.0		346		48
Canned	Case		2.3		98		51
Do	do		1.4		54		59
Do	do		2.7		100		60
Do	do		1.3		57		52
Do	do		.7		28		53
Tool chests. (See Chests.)							
Tools	do		.7		33		51
Do	do		19.0		1,376		30

Do	do		2.0		173		27
Do	do		4.0		327		30
Do	Box		6.0		228		58
Do	Case		4.0		157		55
Garden sets	Carton		5.6		105		119
Machine (see also Machine tools)	Case		.7		32		53
Mechanics' hand	Wood box	Wax paper liner	2.3	12	196	184	26
Do	do	Packing material	7.1	58	210	152	75
Oil-well	Case		11.6		638		41
Pneumatic	do		8.3		220		85
Tooth brushes	Carton		2.6		36		160
Tooth paste	Fiber carton	Packages	.7		15		99
Toothpicks:							
Wooden	Wood box	do	4.0		125		72
N. o. s.	do		2.0		40		112
Toweling	Bale	None	15.0		162		207
Towels:							
Bath	Wood box		10.0		115		192
Cotton	Case		28.8		423		153
Do	Bale		11.6		325		80
Do	do		12.3		347		80
Huck, 100 doz	Wood box, paper liner	Paper wrapping	14.7	82	255	165	132
Terry, 25 doz	do	do	22.5	107	270	155	187
Paper	Corrugated fiber carton		2.8	3	25	22	249
Do	Wood box		11.0		105		236
Toys, n. o. s.	do		3.4		39		196
Tracing cloth	do		4.0		160		56
Tractor parts	Package		8.0		619		30
Do	Case		4.0		156		60
Do	Wood box		8.7		469		40
Do	do		1.7		365		11
Do	Package		8.1		403		45
Tractor wheels	Loose		25.8		769		75
Do	Bundle		26.3		288		203
Do	Loose		7.3		123		133
Tractors (see also Agricultural machinery)	Boxed		246.9		7,520		74
Do	do		342.2		11,000		70
Do	do		257.8		8,100		72
Do	Crated		137.7		4,113		77
Do	Unboxed		499.5		18,092		62
Do	do		190.1		6,350		68
Do	do		222.9		6,900		74
Do	do		296.7		11,600		58
Do	do		304.7		12,375		56
Do	do		276.2		10,377		60
Do	do		974.9		33,388		65
Do	do		176.7		6,436		63
Do	do		223.2		7,436		67
Do	do		181.4		6,057		68
Do	do		167.8		5,557		69
Do	Box		61.0		2,880		48
Do	Case		132.0		4,812		60

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Tractors (see also Agricultural machinery)—Continued	Unboxed	Piece	362.0		3,390		240
Traffic signal controls, electrical	Wood box	None	6.5	40	165	125	86
Do	do	do	3.2	27	112	75	64
Do	do	do	3.2	36	97	61	75
Trailer parts	do		44.0		1,033		95
Trailers:							
17-ft. model:							
Furnished, drawbar and bumper removed	Unboxed	None	862.0		2,350		830
Furnished, drawbar and bumper installed	do	do	920.0		2,350		861
Unfurnished, drawbar and bumper removed	do	do	862.0		1,680		1,179
Unfurnished, drawbar and bumper installed	do	do	920.0		1,680		1,244
19-ft. model:							
Furnished, drawbar and bumper installed	do	do	1,046.0		2,710		861
Furnished, drawbar and bumper removed	do	do	934.0		2,710		772
Unfurnished, drawbar and bumper installed	do	do	1,046.0		1,760		1,318
Unfurnished, drawbar and bumper removed	do	do	934.0		1,760		1,179
22 ft. model:							
Furnished, drawbar and bumper installed	do	do	1,236.0		3,520		800
Furnished, drawbar and bumper removed	do	do	1,123.0		3,520		723
Unfurnished, drawbar and bumper installed	do	do	1,236.0		2,250		1,244
Unfurnished, drawbar and bumper removed	do	do	1,123.0		2,250		1,120
Transformers	Case		5.3		394		30
Do	do		3.7		299		28
Do	do		2.1		168		28
Do	do		14.0		379		80
Electric	Package		13.0		399		73
Radio	Case		2.8		103		61
Do	do		1.6		48		74
Do	do		1.6		98		36
Transmission gears. (See Clutch plate.)							
Traps, fly, wire	Wood box						220
Traps, mouse and rat	do						87
Trays, ash, brass	do	3 cartons	1.1	10	118	104	21
Trichlorethylene	Steel drum, ICC-5E	None	11.7	53	703	650	37
Triethanolamine	do	do	11.7	52	562	510	47
Trimming press, geared	Wood box	do	270.0	2,000	12,500	10,500	48
Do	do	do	413.0	2,190	16,690	14,500	55
Tripoli powder	Bag		2.7		201		29
Trolley frog	Wood box		5.2		310		37
Trousers, cotton	Bale	None	3.6		90		89
Truck:							
Cabs	6 each, cases		178.7		1,540		268
Do	Crate		88.7		900		220
Do	do		46.3		470		220
Cargo bodies	Bundles		221.0		2,920		170

Chassis	Cases, 2 each		341.3		6,930		110
Do	do		276.8		5,440		115
Do	do		491.4		8,900		123
Do	Case		166.4		5,885		63
Do	do		165.9		5,650		66
Do	do		355.5		6,900		119
Do	do		270.3		5,660		108
Do	do		307.8		6,400		110
Do	do		313.6		7,110		101
Do	do		412.4		4,125		96
Do	do		153.6		1,050		323
Do	do		262.7		5,326		111
Do	do		284.0		5,531		115
Do	do		206.0		4,160		111
Do	do		6.5		202		72
Do	do		326.7		7,130		103
Chassis parts	do		68.1		2,105		72
Do	do		31.5		1,570		44
Do	do		57.8		760		173
Parts	do		13.0		375		78
Do	do		31.1		1,085		62
Do	do		7.0		224		73
Trucks:							
Empty	Unboxed						360
Hand	Wood crate		14.0		110		285
Knocked-down	{Case		318.7		6,800		106
	{do		61.1		560		244
Cowl	1 case		102.3		907		253
Chassis	do		171.3		4,987		78
Axles	do		39.1		1,984		44
Wheels	1 bundle		9.3		240		87
Do	do		9.3		240		87
Do	1 piece		11.3		295		86
Total wheels	4 pieces		45.3		1,179		86
Total			376.7		9,539		90
Pressed steel, hand hose	Wood box						111
Trucks and trailers, electric platform	do						71
Tubes (see also Tubing):							
Aluminum, collapsible	Bundle						160
Boiler	do	None	1.0		84		27
Do	Loose		46.0		1,933		54
New, straight							30
Brass, condenser	Wood box	None	5.8	85	591	506	22
Collapsible	Wood crate	24 units	12.0	53	155	72	172
Inner:							
Automobile	Case		20.3		409		112
Do	do		14.0		253		126
Do	do		19.7		348		126
Do	do		3.3		68		110
Do	do		15.8		281		126
Do	Carton		.7		12		139
Do	Fiber carton	6 boxes	1.1	1	20	16	124

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UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Tubes (see also Tubing)—Continued.							
Inner—Continued.							
Passenger car	Corrugated fiber carton	6 cardboard boxes	1.0	3	17	14	132
Do	do	6 boxes	1.7	4	24	20	150
Truck	Fiber carton	Paper wrapping	.5	1	10	9	102
Truck and bus	Corrugated fiber carton	Wax paper	.5	1	6	5	187
Do	do	do	.3	1	4	3	168
Do	Corrugated fiberboard	do	8.0	7	110	103	157
Do	do	do	3.8	5	63	58	135
Do	do	do	2.0	4	30	26	149
Do	do	do	1.5	3	20	17	168
Do	do	do	.9	2	13	11	155
Rubber	Carton		4.0		55		153
Tubing (see also specific kind):							
Aluminum	Wood box	Packing material	20.4	190	731	531	90
Do	do	do	9.4	116	391	268	53
Do	do						100
Brass	do		8.7		614		32
Do	do	None	12.0	81	611	530	44
Do	do	do	15.3		565		60
Copper, coiled	do	do	19.5	120	443	323	97
Steel	Bundle	do	.7		82		18
Do	Box		15.0		619		53
Seamless	Piece		3.3		368		20
Do	Box		20.3		982		47
Do	do		21.2		939		51
N. o. s.	Bundle		49.0		3,672		30
Tubs:							
Galvanized	Nested						140
Ice-cream	do						140
Wooden	do						280
Tumblers, laundry, drying	Wood box						284
Tuna fish, canned	do	48 cans, ½ lb. each	.8	5	32	21	55
Tungsten ore. (See Ore.)							
Turmeric	Bag		4.3		129		74
Turpentine	Drum		11.0		442		56
Do	do		11.7		444		50
Do	Steel drum	None	11.1	50	432	382	57
Do	Wood box	Cans	2.5		92		60
Do	do	6 cans, 1 gal. each	1.8	12	59	42	68
Turpentine gum, spirits of	do		2.0		86		54
Turpentine substitute	Drum		10.7		438		55
Turret lathe	Wood box	Waterproof paper	208.0	600	4,300	3,700	108
Do	do	do	275.0	1,250	8,500	7,250	73

Twine:							
Binder	Bale		1.2		56		47
Do	do		1.3		56		53
Do	do		2.1		56		83
8 balls	do	None	1.3	2	50	48	56
10 balls	do	do	1.9	2	50	48	86
Cotton	Case		9.4		246		86
Jute, coarse, unfinished	Bale	None	27.1		500		124
Do	do	do	12.9		250		118
Do	do	do	7.3		150		107
Do	Reel	do	4.2		100		93
Do	do	do	2.2		50		97
Sail and sewing	Bale	do	4.7		144		72
Do	Reel	do	3.5		100		77
Do	do	do	1.6		50		70
Do	Coil	do	4.2		100		93
Do	do	do	1.7		50		77
Sisal	Bale	do	1.3		50		56
Coarse, finished	do	do	21.4		500		97
Do	do	do	10.7		250		97
Do	do	do	4.2		100		93
Do	Reel	do	2.2		50		97
N. o. s	Bundle	do	2.8		96		66
N. o. s	Wood box		4.0		85		106
N. o. s	Bale	None	2.0		54		82
Twist drills	Wood box	Paper wrappers	2.2	25	175	150	28
Do	do	do	2.2	25	200	175	24
Do	do		3.2		212		34
Do	do		2.1		231		20
Do	do		1.7		152		26
Do	do		1.3		105		29
Type	do		1.0		90		24
Casting	do		78.3		2,160		81
Typesetting machines	Case		57.3		1,170		109
Do	do		95.7		2,400		91
Do	Wood box	None	178.0	750	4,400	3,650	91
Do	do	do	185.0	950	4,250	3,300	98
Do	do	do	175.0	580	3,600	3,020	109
Parts	Case		1.5		82		41
Typewriters:							
Office	Wood box	Packing material	6.9	44	108	51	140
Do	do	do	3.3	25	63	38	118
Do	do	1 wood crate	2.3	13	54	38	97
Portable:							
In carrying cases (5)	do	Separators	4.4	29	104	69	97
In carrying cases (10)	do	10 cartons	6.1	36	143	99	97
Noiseless, in carrying cases (4)	do	Separators	3.6	16	91	69	90
Remington Rand	Case		3.3		73		100
Royal	do		2.8		63		100
Do	do		3.7		69		119
Do	do		4.3		80		119

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Typewriters—Continued.							
Underwood	Case		4.7		81		126
Do	do		3.5		64		122
Do	do		9.5		145		146
N. o. s.	Package		4.0		76		108
N. o. s.	Case		3.0		64		115
N. o. s.	Box		3.0		55		108
Ultramarine blue	Wood barrel	None	10.1	27	327	300	70
Do	do	do	10.1	26	226	200	102
Do	do	do	6.5		279		52
Do	do	do					70
Do	Keg		4.0		114		78
Do	Bag	None	3.2		154		47
Umbrellas	Wood box		9.0		272		74
Do	do		2.7		58		106
Underwear:							
Cotton	do	Cardboard boxes	25.7	105	250	145	87
Do	do		21.5		294		164
Worsted	do		41.5		564		147
N. o. s.	Case		13.7		174		176
Urea	Cloth bag, paper-lined	None	3.1	2	102	100	68
Do	Bag		1.9		101		42
Do	do		2.4		101		53
Do	do		2.8		101		63
Vacuum:							
Bottles	Case		6.6		131		113
Do	do		5.0		104		108
Do	do		1.4		29		109
Do	do		9.6		103		112
Do	Wood box						130
Cleaners	Case		23.9		342		111
Do	do		16.5		275		134
Do	do		17.9		289		139
Do	do		17.6		279		141
Do	do		6.6		100		147
Do	do		19.3		290		149
Do	do		6.2		78		177
Do	do		6.8		83		184
Do	do		18.7		217		193
Do	Wood box						106
Flasks	Case		21.9		440		112
Valises	Wood box		43.0		361		266
Valve oil	Steel barrel	None	11.0		403		50
Valve parts	Case		2.2		34		143

Valves:							
Brass	Wood box		10.8		208		117
Do	Barrel		8.0		290		62
Brass and iron	Case		5.7		436		29
Iron	do		5.7		458		28
Do	do		7.8		526		33
Steel	do		1.5		57		59
Steel, and parts	do		4.2		328		28
Tire cap	Carton		.2		1		372
Tire core	Case		.6		11		119
N. o. s.	Wood box		6.0		196		70
Vanadium ore. (See Ore.)							
Vanilla beans	do		2.5		120		47
Do	Bag	None	2.8		125		51
Varnish	Wood box	6 cans, 1 gal. each	1.8	12	59	42	68
Do	do	24 cans, 1 qt. each	1.9	12	65	45	64
Do	do	Cans	2.3		105		50
Stencil	Case		2.0		28		160
Varnish and lacquer	Wood barrel	None					62
Do	Wood box						65
Do	Drum	None					54
Vaseline	Case		4.3		184		51
Do	do		3.2		132		54
Do	do		3.4		219		54
Do	do		3.4		135		57
Do	Barrel		11.9		425		63
Vegetable oil	Solid fiber carton	6 tins, 1 gal. each	1.1	7	53	46	47
Do	Wood box	10 tins, 1 gal. each	2.3	18	88	70	38
Do	do	6 tins, 1 gal. each	1.4	13	59	46	59
Do	do	20 tins, ½ gal. each	2.3	20	90	70	57
Do	Metal drum, 55-gal	None	12.0	53	480	427	56
Vegetable wax. (See Wax.)							
Vegetables, canned, n. o. s.	Carton		.8		42		45
Velvet. silk or mixed rayon and silk	Wood box	Cartons	22.1	95	229	98	224
Velveteen, cotton:							
490 yd	Fiber carton	Tubes	19.2	34	251	203	172
105 yd	do	do	5.3	6	47	38	249
20 yd	Paper wrapping	do	.8	2	12	9	149
Veneer:							
Birch	Crate		24.0		782		69
Do	do		9.3		297		70
Mahogany	do		17.3		557		69
Do	do		18.7		437		96
Do	do		32.2		676		106
Do	Case		21.2		506		94
Oak	Crate		32.1		691		104
Walnut	do		7.8		195		90
N. o. s.	do		32.3		938		77
N. o. s.	do		7.7		187		92
N. o. s.	do		8.0		185		97
N. o. s.	do		19.0		431		99
Veneer boards	do		16.1		116		312
Vermicelli	Plywood box	None	.5	2	12	10	93

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Vermiculite:							
Crude	Bag	None					23
Exfoliated	do	do					319
Do	do	do					230
Vibrators, electric	Wood box		10.4		140		167
Vinegar	do		1.9		60		71
Do	Wood barrel	None	12.0		472		57
Do	do	do	9.2		290		70
Do	Wood keg	do	3.0		103		66
Vinyl acetate and resins	Steel drum, ICC-5E	do	11.5	50	460	410	56
Do	Steel drum, ICC-5	do	1.2	7	42	35	65
Do	Wood box, ICC-15A	1-gal. can	.8	9	22	8	79
Vinyl chloride	Steel cylinder, ICC-26-300	None	5.9	125	334	185	40
Do	do	do	.7	25	44	19	34
Do	do	do	.2	6	10	4	35
Vises:							
Iron	Wood barrel	do	11.9		835		32
Machine	Wood box		1.1		104		23
Do	do		3.3		247		30
Screw and lever	do		5.7		615		21
Vitriol, blue. (See Bluestone; Copper sulfate.)							
Wagon parts. (See specific name.)							
Wagons	do		212.0		1,400		340
Do	Wood crate		103.0		1,720		134
Wallboard	Crate		12.7		330		86
Do	do		12.9		330		88
Do	do		9.9		172		129
Do	do		8.9		148		135
Do	do		11.4		183		140
Do	do		11.7		176		149
Do	do		9.5		138		155
Wallpaper. (See Paper.)							
Wallpaper cleaner	Wood box	Tins					46
Walnut squares							75
Walnuts:							
In the shell	Cloth bag	None	5.8	2	112	110	118
Do	Wood barrel	do	8.5	22	147	125	130
Do	Burlap bag	do	5.7	1.5	111.5	110	114
Do	do	do	5.5	1	101	100	122
Do	Solid fiber carton	2 fillers	2.7	7	57	50	106
Do	do	12 mesh bags, 8 oz. each	3.3	3.5	51.5	48	144
Shelled	Tin box	24 cans	.4	4.5	9	4.5	99
Do	do	do	.9	7.5	19.5	12	104
Washboards	Bundle	None	2.5		37		151

Washers:							
Iron or steel	Wood box		.7		56		27
Steel heel	Keg	None					15
Washing machines	Case		14.4		265		122
Do	do		20.9		348		135
Do	do		15.4		252		137
Do	do		18.0		250		161
Do	do		16.7		226		166
Do	do		17.3		223		173
Electric, household:							
Spinner-type	Wood box	None	34.5	78	333	255	224
Wringer-type	do	do	26.2	64	248	184	249
Do	do	do	22.2	60	230	170	224
Washing powder	Wood barrel	do	3.8		100		86
Do	Half barrel	do	3.3		128		56
Waste, istle. (See Istle waste.)							
Waste, printing roller compound	Bag	do					103
Waste, silk. (See Silk waste.)							
Watches	Wood box		1.0		46		49
Water, carbonated	do	48 bottles, 12 oz. each	2.1	12	98	36	48
Do	do	96 bottles, 6 oz. each	2.7	16	120	36	49
Water bowls	Wood crate	None	4.0		52		170
Water coolers, metal	Wood box						182
Water filters	Wood crate		3.1		42		164
Do	do		2.3		31		168
Waterproofing cement. (See Cement.)							
Waterproofing compound	Wood barrel	None					54
Water softener, bituminous coal treated	Bag	do					43
Wax (see also specific product):							
Candelilla	do	do					84
Do	Bale	do	7.0		179		90
Carnauba	Bag		5.3		200		60
Do	do		5.7		200		64
Do	do		6.3		200		70
Do	do		6.3		178		80
Refined, flaked	Cloth bag, double	None	6.4	3	153	150	93
Floor, liquid	Wood box	6 cans, 1 gal. each	1.8	12	46	39	72
Do	do	24 cans, 1 qt. each	1.9	12	59	39	70
Do	do	48 cans, ½ pt. each	1.0	9	39	22	59
Mineral	Bag	None					50
Do	Wood barrel	do					68
Montan, powdered	Wood barrel, paper liner	do	8.1	25	250	225	72
Paraffin	Bag		4.4		222		44
Do	do		4.3		201		47
Do	do		4.8		223		49
Do	do		5.3		226		52
Do	do		5.5		224		55
Do	Barrel		11.9		437		61
Do	do		13.3		440		68
Do	Wood barrel	None	13.9	70	425	355	72
Do	do	do	9.8	24	290	266	75
Do	Wood box	do	5.8	45	265	220	49
Do	Cloth bag	do	4.2	2	222	220	42

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Wax (see also specific product—Continued							
Paraffin—Continued							
Do	Cloth bag	None	2.1	1	111	110	41
Do	Wood box	do	3.0	24	124	100	53
Do	Fiber carton	do	1.9	4	88	84	48
Do	Wood box	do	3.7	27	138	111	60
Do	do	do	5.9	38	258	220	51
Do	Bag	do	2.5	1	112	111	50
Do	do	do	4.7	3	223	220	47
Do	do	do	4.3	2	202	200	48
Polishing	Case		1.0		12		187
Do	do		1.2		33		79
Refined	Bag		2.4		112		48
Sealing	Wood box		2.0		66		68
Shoe	do						48
Do	Wood barrel	None					67
Vegetable	Case		11.8		480		56
Do	Drum	None					52
N. o. s	Carton		.7		12		125
Weather-strip metal	do		2.7		22		281
Do	do		2.9		24		272
Welders (see also Arc welder)	Case		11.3		321		79
Welding rods	Wood box	None	.6	10	110	100	12
Do	Bundle		2.0		511		9
Steel	Case		.6		94		14
Wheat (see also Flour; Starch)	Bag	None	2.8		151		42
Do	do	do	3.6		149		53
Do	Bulk						47/49
Flakes	Fiber carton	Packages	3.0		28		245
Germ	Bag	None					43
Do	do	do	4.0		100		80
Do	do	do	3.0		112		63
Wheelbarrow handles and wheels	Bundle	do	2.8		45		145
Wheelbarrows	Wood crate		20.0		699		65
Knocked-down	Bundle		14.6		767		43
Do	do		2.8		74		84
Wheels:							
Automobile	Loose		1.7		68		55
Do	do		2.3		47		107
Car, on axles							67
Wagon, wooden	Bundle						256
Whetstones	Case		4.8		600		18
Sand	Wood box		5.8		348		38
Whey, animal	Bag		2.3		100		50

Whisky	Case		1.1		42		58
Do	Fiber carton	12 bottles, ⅛ gal. each	.9	2	38	19	53
Do	do	24 bottles, 1 pt. each	1.3	3	50	24	61
Do	do	48 bottles, ½ pt. each	1.5	3	57	24	61
Do	Wood box	12 bottles, 1 qt. each	2.1	11	55	24	86
Do	Fiber carton	do	1.3	3	45	24	70
Do	Wood box	12 bottles, ⅛ gal. each	1.5	10	47	19	70
Do	Wood barrel	None	13.0		500		58
Do	Puncheon	do	46.0		1,800		57
Do	5-gal. keg	do	1.6				64
Do	Half barrel	do	7.0		275		57
Do	10-gal. keg	do	2.5		105		53
Whiting chalk	Bag	do	1.0		51		45
Do	do	do	1.2		51		51
Do	do	do	2.5		102		55
Do	Wood barre	do	7.2		386		42
Wick burners	Case		5.2		93		125
Wicking, cotton ball	Bale	None					170
Windmills	Wood crate						75
Window:							
Cord	Wood box		2.0		30		149
Frames	Wood crate		15.5		465		75
Sides	do		22.8		211		245
Windshields	Wood box		10.6		339		40
Wines, domestic:							
Still	Wood keg, 5-gal	None	1.3	15	55	40	55
N. o. s.	Wood box	Bottles	1.6		47		76
N. o. s.	Wood barrel	None	13.0		494		59
N. o. s.	Wood cask	do	30.0		1,200		56
N. o. s.	Pipe	do	33.2		1,320		56
Wire:							
Aluminum	Wood box		3.6		250		32
Do							50
Baling	Bundle		2.3		129		40
Barbed	Steel spool	None	1.1	2	102	100	24
Do	do	do	1.3	2	102	100	28
Do	do	do	1.4	2	102	100	32
Do	do	do	.9	1	81	80	25
Do	do	do	.6	1	71	70	20
Do	Reel						54
Do	do	None	2.4		100		52
Brass	Barrel		6.6		562		26
Do	do		9.2		762		27
Do	do		5.8		466		28
Do	Case		7.0		525		30
Do	do		8.2		539		34
Do	do		8.8		567		35
Do	do		9.7		578		37
Bronze	do		5.3		482		25
Do	do		6.7		565		26
Do	do		6.7		586		31
Do	do		7.0		125		125

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Wire—Continued.							
Copper (see also Copper)	Wood barrel	None					33
Bare	Reel		2.7		247		29
Insulated	Box		6.3		352		40
Do	do		11.1		614		40
Do	Coil		2.9		265		25
Do	Fiber carton		1.2		59		44
Plain	Case		3.8		245		35
Do	do		3.1		192		36
Do	do		3.7		211		40
Do	do		5.8		303		43
Do	do		5.2		265		44
Rubber-covered	Coil		1.3		97		33
Galvanized	Reel		.8		48		41
Do	Coil		.7		55		30
Iron, plain	Case		1.4		103		32
Do	do		1.7		103		37
Do	Barrel		8.0		573		32
Plain or galvanized	Wood barrel						34
Plain or galvanized, in coils, or bundle coils	Bundle						35
Do	Coils						30
Nickel	Barrel		11.5		928		28
Nickled, chrome	Coil						45
Steel	Case		14.2		506		53
Do	do		15.4		660		52
Do	Bundle		7.0		482		30
Do	Coil		3.9		372		24
Do	do		1.9		173		25
Do	Box		14.8		684		49
Do	Crate		7.7		390		44
Do	do		8.2		395		46
Telephone	Coil	None	2.0		112		40
Do	Bundle	do	1.9		100		43
Tungsten	Wood box		2.4		117		46
N. o. s.	Case		2.1		230		20
Wire brushes	do		2.0		105		43
Wire cloth (see also Pot cleaners)	do		1.0		42		53
Do	Box		8.7		334		58
Wire fencing. (See Fencing; Wire.)							
Wire netting	Roll		3.3		86		87
Do	do		4.8		95		114
Do	do		1.5		58		58
Wire splicers (trolley)	Case		3.9		340		26
Witch hazel	Barrel		11.8		513		52
Do	do		11.3		480		53
Do	do		11.9		489		55

Do	do		12.3		495		56
Do	do		13.3		512		58
Do	do		12.5		475		59
Do	do	None					50
Do	Wood box		1.2		36		75
Woodpulp (see also Pulp)	Bale	None	7.3		392		42
Do	Roll, woodpulp wrapper	do	17.2		521		74
Do	Bundle		10.0		452		50
Bleached	Bale	None	7.3		400		41
Chemical	do		8.6		378		51
Do	do		9.3		379		56
Kraft	do		10.3		442		52
Sulfite	do	None	8.0		450		40
Bleached (rayon)	do	do	9.4		387		54
Unbleached	do	do	8.3		400		46
N. o. s	do		8.2		377		48
N. o. s	do		8.6		400		48
N. o. s	do		9.0		383		53
N. o. s	do		10.3		358		65
Wood tar	Can	None	10.6	50	485	435	49
Woodworking machinery (see also specific name):							
Band saw	Wood box	do	60.0	250	1,650	1,400	80
Combined resaw and scroll saw	do	do	172.0		5,400		72
Heavy-duty, with motors	do	do	130.0		4,000		72
High-speed, with motors	do	do	107.0		3,150		77
Log-cutting-off, 48-in	do	do	120.0		2,700		97
Bolter, 4-ft	6 wood boxes	do	120.0	600	3,000	2,400	90
Boring machines:							
Automatic, with motor	Wood box	do	100.0		3,600		62
Close center, with motor	do	do	60.0		1,550		86
Single-spindle, vertical, and motor	do	do	30.0		550		149
Two-spindle, horizontal	do	do	30.0		850		80
Lathes:							
Heavy double-end, no motor	do	do	165.0		5,400		68
Motor head	do	do	98.0		2,280		97
Pattern makers', no motor	do	do	320.0		10,500		68
Planers	2 wood boxes	do	90.0	500	2,750	2,250	72
Do	Wood box	do	70.0	260	1,760	1,500	90
Do	do	do	32.0	100	820	720	86
With motor	do	do	500.0		21,500		52
Planers and joiners, with motor	do	do	105.0		3,500		68
Do	do	do	47.0		1,150		93
Sanders:							
Disk, with motor	do	do	20.0		550		81
Disk and spindle, with motor	do	do	70.0		2,200		71
Edge and form, with motor	do	do	95.0		1,900		112
Reversible, with motor	do	do	190.0		3,000		140
Saw benches	do	do	30.0	150	1,200	1,050	56
Do	do	do	28.0	125	900	775	65
Do	do	do	52.0	190	850	660	137
Sawmills	do	do	385.0	2,500	14,500	12,000	59
Do	do	do	175.0	600	6,100	5,500	64
Do	do	do	100.0	350	3,750	3,400	60
Surfacer, single	do	do	220.0		9,500		52

UNITED STATES EXPORT AND REEXPORT COMMODITIES—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Wool:							
Greasy	Bale	None	15.6		286		122
Waste	do	do					160
Sweepings	do	do					100/125
Flock	do	do					140
Worcestershire sauce	Wood box	Bottles	1.5		42		80
Wormseed oil	Metal drum, 55-gal	None	1.5	12	62	50	54
Wrappers, cheese	Wood box		8.0		307		58
Wrappers for bottles. (See Bottles.)							
Wrenches:							
Engineers'	do		.4		26		36
Pipe	do		2.0		185		25
Socket	do		7.2		345		46
Steel	do	Cardboard	2.9	20	167	147	39
N. o. s	do	Wood boxes	5.6	40	372	302	33
N. o. s	do	do	5.6	32	360	296	35
N. o. s	do	None	2.7	28	258	230	24
N. o. s	do	do	2.3	24	164	142	32
X-ray films	do	24 cartons	16.8	45	380	317	97
X-ray tubes	Case		5.1		10		1,140
Xylol	Steel drum, ICC-5E, 55-gal	None	11.6	53	450	397	57
Yardsticks	Wood box						90
Yarn:							
Cotton	Bale		14.0		400		78
Do	do		16.1		425		85
Do	Case		21.3		561		85
Do	do		23.8		621		86
Do	do		17.7		405		98
Do	do		11.1		240		103
Do	do		19.5		391		112
Do	do		20.6		368		125
Do	do		28.7		404		159
Do	Wood box	None	17.1	80	400	320	97
Do	do		28.0		406		156
Fine	do	None	9.5	65	315	250	68
Nylon	do		9.0		121		160
Rayon	Plywood box	Cones, boxes	16.7	49	421	339	90
Do	do	Paper skeins	11.4	43	353	300	72
Silk:							
Spun	Fiber carton	Boxes and tubes	1.9	2	36	28	118
Thrown	Plywood box	Paper cones	10.8	25	175	135	140
Wool	Case		10.2		190		120
Yeast cakes	Wood crate		7.4		100		175
Yellow acid. (See Coal-tar colors.)							
Yellow metal	do		3.0		564		12

Zinc (see also Spelter):							
Ashes	Bulk						9
Chloride	Carboy, ICC-1A	None	6.4	76	226	150	64
Concentrates	Bulk						15
Dross, pigs or slabs	Piece		.5		83		14
Do	Drum	None					23
Dust	Metal pail	do	.8	5	105	100	18
Do	Drum	do	1.7	6	206	200	19
Do	Wood cask	do	13.0		1,560		20
Engravers'	Wood box		2.3		380		14
Photographic	do		1.5		508		7
Ingots	Loose						8
Lead concentrates	Bulk						18
Oxide	Barrel	None	6.7		249		60
Do	do	do	8.9		305		65
Do	do	do	7.4		246		68
Do	do	do	9.7		305		71
Do	Wood barrel	do	10.0	30	330	300	68
Do	Paper bag	do	.8	1	51	50	36
Do	Wood barrel						71
Do	Wood box		7.0		254		62
Plates, rolled	do	None		40	540	500	9
Sheets	Case		2.2		539		9
Do	do		1.7		273		14
Do	do		2.8		362		18
Do	do		6.1		526		26
Do	do		7.6		602		28
Do	Wood cask	None	3.3	25	575	550	13
Skimmings	Bulk						12
Do	Wood cask	None	12.0		1,075		23
Slabs	Loose		1.0		54		40
Stearate	Wood barrel	None					195
Strips	Case		3.0		579		12
Do	do		3.0		490		14
Sulfate	Cloth bag, lined	None	2.7	2	102	100	59
Sulfide	Paper bag	do	1.1	1	51	50	49
White, dry	Wood barrel	do	10.0		590		38
Zonolite	Bag	do					317

COMMODITIES LOADED AT FOREIGN PORTS

The stowage factors in the following list are calculated on the basis of the actual weights and measurements of the commodities as packed for shipment, no allowance for broken stowage or dunnage being included. The factors show the number of cubic feet occupied by one long ton (2,240 pounds) of the commodity named.

In connection with many products loaded at foreign ports, there is considerable variation in the stowage factor, owing to different methods of packing, varying characteristics of the commodity at different times of year and at different shipping ports, etc. Where an exact factor has not been obtainable, the usual range of stowage has been indicated, as for example: Turmeric—Bag—65/76.

[Tare weight, gross weight, and net weight shown in pounds.]

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Abalone, meats	Bag	None	1.5		42		80
Do	Wood box		5.0		120		90
Accordions, Italy	do		20.3		319		205
Do	do		19.4		300		145
Do	do		23.3		288		181
Do	do		28.9		369		175
Do	do		25.7		350		165
Do	do		31.4		336		209
Do	do		31.4		392		178
Accordions, piano, 10 pieces, without fitted case	do	Packing material	20.4	75	311	184	187
Acids:							
Acetic	Wood barrel	None	13.3	85	500	415	61
Benzoic	Wood barrel, paper liner	do	5.7	21	121	100	107
Lactic	Carboy	do	7.3	28	158	130	102
Oleic (red oil)	Steel drum	do	11.7	52	457	405	57
Oxalic	Wood barrel, paper liner	do	9.8	23	348	325	62
Do	Wood cask, paper liner	do	4.9	14	139	125	80
Phosphoric	Wood cask	do	12.7	75	725	650	39
Do	Carboy	do	4.8	66	226	160	48
Stearic	Cloth bag, paper liner	do	3.4	1	101	100	75
Tannic	Wood barrel, paper liner	do	10.5	22	400	378	59
Tartaric	do	do	6.6	26	250	224	59
Do	Wood cask, paper liner	do	3.4	13	125	112	60
Valerianic, liquid	Carboy, basket covering	do	7.3	28	138	110	118
Agar-agar	Bale	do	9.7		284		76
Agar-agar (Japan)	Compressed bale	do					60
Alabaster works (Leghorn)	Wood box		14.7		245		133
Do	do		7.3		243		67
Do	do		12.7		276		101
Albumen, blood	do		8.0		263		68
Albumen, egg	do		6.0		250		53
Do	do	Tin	5.9		244		54
Alfalfa seed. (See Seeds.)							
Allspice	Cloth bag	None	10.3	3	143	140	160
Almonds. (See Nuts.)							
Almond oil. (See Oil.)							

Aloes	Wood box						55/60
Do	do		2.0		127		35
Aluminum foil, coiled	do	Flanges and cores	4.5	22	177	140	57
Aluminum ingots (Marseille)	Pieces		.5		62		18
Aluminum ore (Bauxite). (See Ores and concentrates.)							
Archil	Bale	None					80/90
Amboyna wood							48/50
Ammonium chloride (sal ammoniac)	Wood barrel	None	8.0	24	300	276	61
Ammonium phosphate (nonfertilizer)	Wood barrel, paper liner	do	9.8	23	348	325	62
Do	Cloth bag, paper liner	do	4.1	2	227	225	40
Do	Wood barrel, paper liner	do	4.9	14	139	125	80
Anchovies, canned	Wood box	100 cans, 2 oz. each	.6	9	28	13	50
Anchovies:							
Fillets of (France)	Bundle		1.1		395		6
24's (Genoa)	Wood box		1.0		50		45
100's (Genoa)	do		.7		25		60
Anchovy paste (Genoa)	do		2.3		110		47
Angora goat hair. (See Wool-like hair.)							
Aniseed. (See Seeds.)							
Annatto (Jamaica)	Bag	None	6.6		187		79
Antimony (refined)	Wood box		2.5		560		10
Antimony ore. (See ores and concentrates.)							
Apricot kernels	Bag	None	6.0		220		60
Do	Wood box, tin lined	do	7.3	50	253	203	64
Do	Cloth bag	do	4.8	3	163	160	66
Apricot kernels (Tientsin)	Bag	do	4.8	2	162	160	65
Apricot paste (Palestine)	Wood box		7.1		317		50
Do	do		4.1		198		45
Argols:							
Genoa	Bag	None	4.4		225		44
Leghorn	do	do	4.4		247		40
Italy	Wood cask	do	29.7		1,215		54
Do	do	do	18.3		620		66
Argols, tartar and wine lees (see also wine lees)	Cloth bag	do	4.5	3	278	275	36
Do	do	do	4.1	3	227	224	41
Arrack	Wood cask	do					75/80
Do	Wood box	Bottles					55/75
Arrowroot	do						70/72
Starch (Dominican Republic)	Bag	None	6.3		220		64
Do	do	do	3.4		140		55
Arrowroot and arrowroot starch	Wood barrel	None	7.7	25	325	300	53
Do	do	do	5.9	22	242	220	55
Asafetida	Bag	do			145		50
Do	Wood box						40/42
Asbestos. (See Minerals.)							
Asphalt	Bag	None	6.1		244		56
Mexico	Bulk						52/55
Trinidad	Wood barrel	None					46
Curacao	Bulk						55/60
Bagging, old (Alexandria)	Bales		34.2		526		143
Do	do		39.6		792		108
Balata	Bag	None	2.7		150		41
Do	do	do	4.4		168		59

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Balata (Para)	Wood box						60
Balls. (See under specific name.)							
Balsa wood:							
7 lbs. per cu. ft.							320
8 to 13 lbs. per cu. ft.							224
Balsam:							
Canada	Wood cask	None					50/53
Copaiba	Steel drum	do	13.9	111	526	415	59
Do	do	do	18.2		635		64
Do	Wood box	1 can	1.1	4	52	40	49
Balsam tolu	do		2.0		117		38
Bambarra (East Africa)	Bag	None					65/70
Bamboo (Marseille)	do	do	5.5		40		308
Bamboo, split	Bundle		4.3		110		87
Bananas	Bunch						130
Do	do		1.3		25		130
Do	do		3.0		55		122
Bandages (England)	Cartons		4.9		112		98
Barium hydroxide (hydrate)	Wood cask	None	12.7	50	635	585	45
Barium sulfate	Cloth bag	do	1.0	2	221	219	10
Barjari	Bag	do					55
Bark dust (South Africa)							90
Barytes (Genoa)	Bag	None	.9		110		19
Basils (Australia)	Bale	do	36.0		448		150/185
Do	Truss	do	16.0		224		160
Baskets (Genoa)	Crate		54.9		187		659
Bauxite (aluminum ore). (See ores and concentrates.)							
Beans (see also under specific name):							
Australia	Bag	do	5.2		243		50
East Africa	do	None	5.0		170		65
New Zealand	do	do	5.0		203		56
Rangoon	do	do					63
Beche-de-mer (Trepang)	Bale	do					135/150
Bedspreads (Italy)	Bundles	do	21.6		427		113
Bedspreads, cotton:							
Jacquard figured	Wood box, strapped	Packing material	28.5	79	510	396	124
Do	Cloth bag, strapped	do	21.8	13	360	312	140
Do	do	do	13.5	22	327	261	93
Plain woven (India)	Fiber carton, paper liner	None	8.6	7	82	75	224
Bedspreads, mixed fiber, cotton, rayon	Cloth bale	do	23.7	20	418	398	124
Beef:							
River Plate	Wood barrel	do					90
Canned (River Plate)	Wood box	Tins					50/60
Corned	do	24 cans, 12 oz. each	.5	5	27	18	43
Pickled, salt	Wood tierce	None					58/62
Roasted, canned	Wood box	24 cans, 12 oz. each	.7	7	30	18	54

Beer	Wood ½ bbl	None	5.7	78	210	132	61
Do	Wood cask	do					54/56
Do	Wood ¼-bbl	do	3.1	40	105	65	66
Do	Wood box	48 bottles	1.2	23	100	33	27
Beeswax. (See Wax.)							
Belting, cotton rope:							
1½ in. diameter, 1,000 ft	Bale	None	24.5	14	822	808	66
½ in. diameter, 1,000 ft	Reel	1 wood reel	3.1	4	98	89	72
⅜ in. diameter, 1,000 ft	do	do	2.0	4	60	52	75
Benedictine	Wood box	Bottles	2.3		78		57
Beniseed. (See Seeds.)							
Berets (France)	do		35.0		322		243
Do	do		43.7		330		297
Berries, juniper (Leghorn). (See Juniper.)							
Betel nuts. (See Nuts, Areca.)							
Binder twine (East Africa) (see also Hemp)	Bale	None	1.2		50		55
Birdseed. (See Seeds.)							
Biscuits:							
England	Fiber carton	72 cans	5.0	28	107	57	105
France	Wood box		6.3		118		120
Ireland	Fiber carton	48 packages	3.5	10	36	24	219
Bitterwood (Jamaica)							148
Blankets, wool	Wood box, paper liner	None	31.2	82	293	210	249
Blood, dried	Bag	do	8.0		200		90
Blood, dried (Santo)	do	do					55
Bona bark							100
Bone ash	Wood barrel, tin lined	None	7.9	29	250	221	71
Bone meal	Bag	do					44/46
Bone meal (Calcutta)							55
Bones, crushed (Calcutta)	Bag	None	4.5		175		60
Bones:							
Australia	do	do	5.0		168		70
RiverPlate	do	do					90
Do	Bulk						80
Books.							
England	Wood box		16.6		640		58
Do	do		6.5		267		54
Do	do		7.0		248		63
France	do		11.7		402		64
Do	do		6.3		244		58
Do	do		9.9		442		49
Do	do		18.2		463		87
Do	do		20.4		385		116
Do	do		16.7		450		78
Do	do		5.0		180		67
Italy	do		11.8		363		73
Books, religious (England)	do		8.0		246		73
Bottles, empty, for wine (France)	do		13.9		129		241
Do	do		16.2		226		160
Boussir. (See Rice dust.)							
Bovril (England)	do		5.5		150		85

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Bowl, paper (France)	Wood box		19.5		380		115
Braid, hemp. (See Hemp.)							
Braid straw. (See Straw.)							
Bran:							
Australia	Bag	None	7.0		180		90
New Zealand	do	do	7.0		183		87
River Plate	do	do					100/110
Brandy, Barbaresso (Piraeus)	Wood box		1.4		50		64
Brandy, cherry	do	Bottles	1.9		76		57
Brazilwood (Brazilette)	Piece		.4		11		85
Do	do		.3		8		93
Bread, Passover (Haifa)	Wood box		15.8		206		174
Brewers' grain (Argentina)	Bag	None	8.0		125		143
Briarwood:							
Leghorn	do	do	13.5		220		79
Marseille	do	do	8.0		222		80
Do	do	do	8.0		220		81
Sicily	do	do	13.5		220		79
Bristles:							
Australia	Wood box		4.5		185		55
China	do		3.3		131		57
Do	do		4.6		163		63
India	do		4.4		168		60/70
Bristle fiber (Colombo)	Bag	None					80
Bronze and aluminum powders	Steel drum	do	4.8	15	115	100	93
Buckwheat	Bag	do					66
Dairen	do	do			180		64
Bulbs:							
Flower (England)	Wood box		7.9		252		70
Lily (Japan)	Wood box, slatted	Packing material	2.8	15	133	45	47
Tulip (Netherlands)							82
Burlap fabric	Roll (bale)	None	27.0	20	1,272	1,252	48
Do	do	do	22.8	20	953	933	53
Do	do	do	8.0	1	301	300	59
Burlap jute (Genoa)	Bale		34.2		1,283		58
Butter, salt (River Plate)	Wood box				67		60
Cactus flowers. (See Flowers.)							
Calabar bean (West Africa). (See also Nuts.)							
Calfskins. (See Skins.)							
Camphor	Wood box		2.5		122		46
Crude	Tub	None	9.9		226		98
Synthetic	Wood barrel	do	7.2		174		93
Do	Wood box	Paper liner	9.4		274		77
Do	do	100 cans, 10 lbs. each	3.3		148		49
Do	do	Tin lined	4.9		136		80
Do	do	Paper liner	9.4	54	274	220	77

Synthetic powder	do	Tin lined	4.9	36	136	100	80
Synthetic tablets	do	100 cans, 1 lb. each	3.3	26	148	100	51
Camphor (India)	do						52/55
Camphor oil. (See Oil.)							
Canada balsam. (See Balsam.)							
Canary seed. (See Seeds.)							
Candy (Haifa)	do		7.3		231		70
Do	do		8.3		183		99
Cane works (Genoa)	Crate		54.9		187		659
Canella	Bale	None					130
Canes, Malacca	Bundles or bales						120/140
Canned fruits (Australia). (See Fruits.)							
Cantharides	Wood box		16.6		231		158
Canvas, artists'	do	Fiber tubes	10.9	56	308	207	80
Canvas, jute and cotton	Bale, cloth liner		19.3	14	700	686	62
Capsicums (West Africa)	Bag	None					75
Capsicums, n. o. s					150		1,155
Caraway seeds. (See Seeds.)							
Carbons, activated	Cloth bag, paper liner	None	5.6	3	113	110	112
Do	do	do	7.0	3	78	75	204
Carbon paper tissue. (See Paper.)							
Cardamom seeds. (See Seeds.)							
Carnauba wax. (See Wax.)							
Caroa fiber (Bahia)	Bale	None					100
Carobs. (See Locust bean.)							
Carpets:							
Beirut	Bale		17.7		365		109
Do	do		16.5		276		132
Genoa	do		13.5		267		104
Do	do		14.4		265		123
Do	do		7.8		106		164
Do	do		20.3		335		136
Do	do		16.6		315		116
Italy	do		20.0		341		131
Do	do		5.8		372		35
Do	do		14.1		439		72
Do	do		16.7		342		109
Carpets (specified):							
Jute	do	None	13.0		133		230
Wool, chenille	Wood box	do	98.9	366	1,272	906	172
Do	do	do	56.3	35	737	702	172
Do	do	do	35.8	22	447	425	187
Carthamus seeds. (See Seeds.)							
Cascara bark	Bag	do	7.1		111		140
Casein	Wood barrel	do	9.0		310		65
Do	do	do	9.2		345		64
Casein (Argentina)	Cloth bag	do	4.6	2	133	131	77
Casings:							
Australia	Wood cask	do	12.4		735		38
Do	do	do	26.0		1,008		57
Do	do	do	13.0		504		57
Beirut	Barrel		12.3		545		49
Do	do		13.7		682		45

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Casings—Continued.							
Iraq	Barrel	Burlap lining	7.4	51	409	349	41
Larnaca	do	None	5.4		220		54
Marseille	do		6.9		277		55
River Plate	Wood cask	None			540		90
Cassia	Bale	do	4.3		133		73
Do	do	do	3.1		112		62
Do	do	do	4.3		68		140
Do	Roll	do	3.0		85		76
Do	do	do	5.8		125		104
Do	Wood box		5.3		88		130
Cassia, whole (Saigon)	Straw mat	None	3.5	5	65	60	120
Cassia and cassia vera, unground (China)	Matting		4.1	3	115	112	80
Cassia buds (China)	Wood box						125
Do	Bundle						130
Cassia seeds. (See Seeds.)							
Cassiterite (tin ore). (See Ores and concentrates.)							
Castor beans. (See Seeds.)							
Caviar (U. S. S. R.)	Wood box		1.5		75		50
Do	Keg						50
Cebadilla seeds. (See Seeds.)							
Celery seeds. (See Seeds.)							
Cement:							
Asbestos rock slag wool	3-wall, paper bag	None	2.8	1	51	50	125
Mojo (Japan)	Wood barrel	do	6.0		400		33
Ceresin	Bag	do	3.1		127		55
Do	Wood barrel	do	11.7		500		54
Chalk:							
Crude	do	do	8.9	25	325	300	61
Precipitated	Wood cask, paper liner	do	14.6	33	283	250	118
Do	Wood barrel	do	8.0		205		87
Do	Cloth bag, cloth liner	do	8.1	2	170	168	107
Chamois. (See Skins.)							
Champagne. (See Wines.)							
Chasam (India)	Bale	do			300		90/100
Cheese:							
Albania	Wood box		4.0		176		52
Argentina	do				143		50/55
Bel Paese (Italy)	do	4 boxes, 12 cheeses each	3.7	14	70	52	118
Bleu (France)	do	12 pkgs., 5½ lbs. each	2.0	16	82	66	55
Camembert (France)	do	60 pkgs., 9 oz. each	1.7	7	47	34	80
Do	do	24 pkgs., 4 oz. each	.4	2	12	6	68
Edam (Netherlands)	do	12 cheeses and separators	1.6	8	54	46	68
Genoa	Barrel		3.3		143		53
Do	Tub		6.9		238		62
Do	Churn		.7		24		70

Do	Wood box		5.2		161		72
Do	do		4.7		191		56
Do	do		5.1		170		66
Do	do		4.0		110		50
Do	do		5.3		187		63
Do	do		4.1		137		65
Do	do		4.5		209		48
Do	do		5.0		86		156
Do	do		5.8		201		62
Do	do		5.8		190		69
Do	do		5.3		207		58
Do	do		4.7		190		55
Do	Tub		6.9		257		57
Do	Barrel		6.0		222		60
Gorgonzola (Italy)	Wood tub	1 unit, 19 lbs	.8	5	24	19	70
Gouda (Netherlands)	Wood box	4 units, 6 cheeses each	.9	5	27	20	72
Gruyere (Switzerland)	do	72 pkgs., 8 oz. each	.8	12	48	36	39
Do	do	72 units, 6 cheeses, each	1.1	12	48	36	52
Kasseri (Piraeus)	do		5.7		245		51
Kefalotryi	do		4.0		110		80
Leghorn	do		5.7		212		59
Do	do		3.7		130		62
Parmesan (Italy)	Wood tub	4 cheeses	7.5	20	267	247	62
Piraeus	Small barrel		3.6		97		82
Do	Large barrel		27.7		754		83
Provolette (Italy)	Wood box	None	4.4	26	165	139	59
Romano Pecorina (Italy)	do	do	4.8	25	210	185	51
Roquefort (France)	do	12 cheeses, foil wrapped	2.0	16	82	66	55
Do	Fiber carton	12 units, 6 cheeses each	.5	1	17	14	64
Swiss (Switzerland)	Wood tub	4 cheeses	23.3	120	750	630	70
Chemicals, n. o. s. (France)	Wood box		5.2		92		124
Do	do		8.7		169		116
Do	do		12.9		216		134
Do	do		5.6		149		83
Cherries in brine (Italy)	Wood barrel	None	15.1		632		54
Do	do	do	13.2		526		56
Cherry stems	Bale	do	39.0		433		200
Do	Bag	do	2.3		19		265
Chickory	do	do	6.0		132		102
Chickpeas (Marseille)	do		8.1		315		57
Chicle	Cloth bag, paper liner	None	5.2	2	200	198	59
Do	Bag	do	2.0		90		50
Colombia	do	do	2.5		133		42
Mexico	Wood box						50/60
Chillies:							
East Africa	Bag	None	7.0		160		98
West Africa	do	do					120
Zanzibar		do	8.0		160		112
China clay	Bulk						38/40
Do	Bag	None					42
Do	Wood cask	do					46/50

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
China grass (Rhea fiber)	Pressed bales	None					44/46
China root. (See Roots.)							
Chinaware:							
France	Wood box		12.8		192		150
Do	do		13.7		153		200
Do	Barrels		16.2		71		509
Do	do		12.4		238		117
Do	Cask		31.2		1,210		57
Chinaware, assorted:							
Japan	Wood box	Packing material	19.6	128	350	222	124
Do	do	do	16.7	105	320	215	118
Do	do	do	13.1	75	300	225	97
Do	do	do	12.3	78	245	167	112
Do	do	do	15.7	95	270	175	132
Chinaware, classified (Japan):							
Cups and saucers, 30 doz	do	do	12.6	85	300	215	93
Do	do	do	16.8	107	295	188	124
Do	do	do	12.5	73	240	167	118
Dinner sets, 93 pieces, 4 sets	do	do	17.3	108	340	232	112
Dinner sets, 93 pieces, 1 set	Fiber carton	do	3.3	12	70	58	102
Dinner sets, 63 pieces, 1 set	do	do	3.0	14	48	34	140
Do	do	do	2.8	11	50	39	124
Do	do	do	3.3	29	70	41	102
Dinner sets, 55 pieces, 1 set	do	do	2.6	10	45	35	132
Do	do	do	2.6	14	44	30	132
Dinner sets, 32 pieces, 16 sets	do	do	16.9	94	370	276	102
Dinner sets, 32 pieces, 12 sets	do	do	14.7	99	310	211	107
Plates, 6-inch, 30 doz	do	do	12.2	80	320	240	86
Plates, 7¼-inch, 48 doz	do	do	11.5	93	330	237	77
Plates, 9-inch, 21 doz	do	do	14.6	94	308	214	107
Plates, 10-inch, 15 doz	do	do	12.3	75	300	225	93
Plates, 10-inch, 15 doz	do	do	12.3	82	295	213	93
Sugars and creamers, 180 sets	do	do	27.5	182	385	203	160
Teapots, 15 doz	do	do	21.6	86	300	214	160
Teapots, 10 doz	do	do	21.9	105	300	195	160
Teapots, 6 doz	do	do	18.9	114	240	126	172
Tea sets, 32 pieces, 6 sets	do	do	4.9	15	65	50	172
Tea sets, 23 pieces, 24 sets	Wood box	do	18.9	118	310	192	140
Do	do	do	20.7	147	330	183	140
Tea sets, 23 pieces, 12 doz	do	do	12.3	80	190	110	149
Tea sets, 23 pieces, 6 doz	do	do	6.6	45	100	55	149
Do	do	do	5.3	41	95	54	124
Chinawood. (See Oil.)							
Chrome ore. (See Ores and concentrates.)							
Cigarette paper. (See Paper.)							

Cigars	Fiber carton	50 boxes, 50 each	4.3	3	86	47	112
Do	do	20 boxes, 50 each	1.8	2	35	19	118
Do	Wood box		6.6		124		119
Do	do		8.4		104		181
Cinchona bark	Bale	None	20.0	5	200	195	224
Do	do	do			224		135/145
Cinder earth (South Africa)	Bag	do					40
Cinnabar. (See Ores and concentrates.)							
Cinnamon	Bale	do	5.5		102		140
Do	do	do	4.8		102		106
Do	Compressed bale	do	5.0		95		118
Do	Roll	do	4.5		100		102
Do	Wood box	do					90/95
Chips	Bale	do	13.3		345		87
Do	Bundle	do	5.2		100		116
Quills (Calcutta)	Bag	do	4.9		100		110
Do	do	do	5.7		100		129
Citron in brine (Messina)	Cask		28.3		1,069		57
Do	Wood box						70
Citrus fruit (East Africa)	do	None					55
Claret. (See Wines.)							
Cloth (see also Cotton cloth and Wool cloth):							
Oil (Marseille)	Bale	do	1.5		101		33
Tracing	Wood box	do	9.3	50	362	312	57
Do	do	do	7.1	36	256	220	75
Clover seed. (See Seeds.)							
Cloves	Bale	do	6.4		145		99
Do	Mat or bag	do	8.0		138		125
Do	Bundle	do	6.3		136		100
East Africa	Bale	do	8.0		160		120
Marseille	Bag	do	5.2		110		105
Oil of	Wood box	2 cans, 60 lb. each	4.5	12	141	120	72
Stems	Bag	None					132
Coal:							
Anthracite (United Kingdom):							
Beans	Bulk						48
Cobbles	do						45/48
Large	do						40/43
Nuts	do						48
Peas	do						48
Scotch	do						43/45
Durham:							
Screened	do						48
Unscreened	do						45/47
Midland:							
Screened	do						47/48
Screened, gas	do						47/50
Unscreened	do						45/47
Nanaimo	do						43
Scotch:							
Dross	do						50
Navigation	do						43/45
Screened	do						47/50

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Coal—Continued.							
Welsh:							
Admiralty (large)	do						42/45
Monmouth (large)	do						43/46
Sized (nuts, etc.)	do						48/51
Small	do						40/44
Thro'	do						42/44
Australian:							
Newcastle	do						43/47
Southern	do						44/46
Japan	do						43/47
New Zealand	do						43/47
Cobalt (South Africa)	Bag	None					12
Do	Bulk						18/20
Cochineal	Wood box, tin lined	None	10.0		250		90
Do	Bag	do			200		55/60
Cocksfoot seed. (See Seeds.)							
Cocoa	Fiber drum	do	8.7	10	230	220	86
Do	Wood barrel	do	10.0	25	225	200	97
Do	Fiber drum	do	4.6	5	115	110	90
Do	do	do	2.3	3	58	55	90
Cocoa beans	Cloth bag	do	5.0	3	143	140	77
Bahia	Bag	do			132		75/80
Brazil	Cloth bag	do	4.6		131		77
Colombia	Bag	do	6.0		170		79
Java	Cloth bag	do	6.0		169		79
Trinidad	Bag	do			200		110/115
West Africa	Cloth bag	do					75
Cocoa beans, dried	Bag	do	2.3		101		49
Do	do	do	5.1		220		52
Cocoa butter	Wood barrel, tin lined	Separators	6.1	28	260	224	52
Do	Bale, paper wrapped	None	3.5	5	194	189	41
Do	Fiber carton, paper liner	do	1.1	2	57	55	42
Cocoa butter (Brazil)	Wood box				156		40
Coconut (see also Nuts and Copra):							
Desiccated (Philippines)	do		5.1		160		72
Do	Bag	None	2.0		33		136
Fiber (Calcutta-Colombo)	Mat	do	1.7		58		68
Do	do	do	1.7		63		62
Coir fiber	Bale	do					100
Oil. (See Oil.)							
Shells	Bag	do	6.7		113		132
Codfish, dry (Nova Scotia)	Wood barrel	do	15.7		486		72
Do	do	do	4.2		140		67
Do	Wood box	do	3.3		123		50

Cod-liver oil. (See Oil.)							
Coffee:							
Brazil	Bag	Bulk	3.7	1	132	131	62
Columbia	do	do	3.9	1.2	140	138.8	62
Costa Rica	do	do	6.3		208		68
Do	do	do	3.4		141		54
Guatemala	do	do	4.5	2	152	150	66
Java	do	do	4.1		134		70
Lisbon	do	do	3.6		134		60
Mazatlan	do	do	5.0		110		102
South Africa	do	do					70
Venezuela	do	do	3.7		132		62
West Africa	do	do					70
Coffee (specified):							
Clean (East Africa)	do	do	5.5		200		65
Green:							
Brazilian, Rio	Cloth bag	do	2.0	2	132	130	50
Colombian	do	do	4.2	2	133	131	70
Guatemalan	do	do	3.2	2	124	122	57
Santos	do	do	5.8	2	202	200	64
Do	do	do	3.9	2	152	150	57
Coffee parchments (East Africa)	Bag	do			112		70
Cognac (France)	Wood box		1.5		49		68
Coir fiber. (See Coconut.)							
Coir yarn. (See Yarn.)							
Colors, dry (Genoa-Leghorn)	Cask		10.7		335		70
Colaz oil. (See Oil, rape-seed.)							
Combustion engine parts (Spain)	Wood box		8.3		281		66
Confectionery (France)	do		9.6		247		87
Do	do		10.2		272		82
Do	do		6.3		196		71
Copper:							
Compounds:							
Acetate	Wood barrel	None	5.0	14	125	111	90
Oxide	Steel drum, 25-gal	do	2.0	8	208	200	21
Sulfate, granular crystals	Wood barrel	do	10.0	24	524	500	43
Sulfate, powdered	do	do	10.0	24	424	400	53
Ores and concentrates. (See Ores and concentrates.)							
Refined:							
Ingots (South and East Africa)							10
Wire bars (South Africa)							15
Semirefined:							
Matte (South Africa)	Bulk						14
Matte and/or blister (West Africa)	do						18
Copperas. (See Iron sulfate.)							
Copra (see also Coconut):							
East Africa	Bag	None	8.0		160		110
Manila							70/80
South Africa	Bag	None					90
South Sea							65/70

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Coral, rough	Bag	None					90
Do	Wood box	do					70
Cordage, hemp. (See Hemp.)							
Coriander:							
Fruits	Bag	do			160		120/130
Plant							85
Seeds. (See Seeds.)							
Cork	Bale	None	31.7		144		480
Agglomerated (Casablanca)	Carton		6.0		55		245
Board (Marseille)	do		7.0		60		259
Floats (Algiers)	Bale		14.7		88		373
Do	do		8.4		48		395
Waste:							
Algiers	do		25.2		176		319
Bona	do		23.9		184		287
Lisbon	do		16.9		148		254
Wood:							
Algiers	do		22.3		168		289
Djidjelli	do		23.7		196		270
Lisbon	do		21.4		170		280
Seville	do		15.7		93		378
Cork:							
East Africa	do	None	16.7		410		90
Egypt	Cloth bale	do	20.1	22	753	731	61
Shanghai	Bale	do	11.7		420		63
South Africa	do	do					80
Sudan	do	do					100
Vladivostock	do	do	28.0		525		120
West Africa	do	do					120
Corundum (Calcutta). (See Minerals.)							
Cotton (see also specific article):							
Hard pressed (Egypt)	Cloth bale	do	20.0		480		58/68
Raw (unspecified)	do	do	10.0	11	410	399	55
Do	do	do	10.2	7	400	393	57
Do	do	do	14.9	9	386	377	86
Raw (specified):							
Alexandria	Bale		10.8		700		58
Australia	Pressed bale	None	35.0		500		130/150
Do	Unpressed bale	do					250
Brazil	Pressed bale	do	10.0		460		50
Do	Bale	do					60/75
Calcutta	do	do	12.0		400		60
China	Cloth bale	do	10.5	12	520	508	46
Cotton-bale covering	do	do	8.7	5	305	300	64
Cotton cloth:							
In the grey	Cloth bale, paper liner	do	16.7	9	528	522	70

Prints	Wood box, paper liner	do	32.9	89	402	313	187
Water-proofed	Wood box	Paper tubes	19.6	70	615	540	72
Upholstery cloth, jacquard figured	do	None	21.6	74	278	205	172
Do	do	do	10.9	86	167	81	149
Velveteen	do	Wood roller	45.3	129	532	293	187
Do	do	Tin foil	23.0	104	311	199	160
Do. (600 yds.)	do	None	23.1	100	300	200	172
Cotton linters (Brazil)	Bale	do					95
Cotton tissue. (See Tissue.)							
Cotton and rayon tissue. (See Tissue.)							
Cotton waste	Cloth bale	do	57.8	35	550	515	224
Do	do	do	12.3	20	500	480	55
Cotton yarn. (See Yarn, cotton.)							
Cottonseed. (See Seeds.)							
Cottonseed cake. (See Oil cake.)							
Cottonseed meal. (See Meal.)							
Cottonseed oil. (See Oil.)							
Cowrie shells	Bag	do					50/60
Crabmeat, canned (Japan)	Wood box	96 cans, 6½ oz. each	2.0	24	78	39	56
Crayfish (South Africa)	do						65
Cream of tartar (potassium bitartrate)	Wood barrel, paper liner	None	6.6	26	250	224	59
Creosote	Wood box	12 cans, 1 gal. each	3.0	18	135	106	50
Croton seeds. (See Seeds.)							
Cubebs	Bag	None					80/85
Cumin seed. (See Seeds.)							
Curicury wax. (See Wax.)							
Currants, dried	Wood box, paper liner	do	1.1	6	56	50	42
Currants (Patras)	Wood box		2.4		110		49
Do	do		1.3		55		50
Curtains, embroidered, Swiss	do	18 boxes	27.7	98	300	166	204
Do	do	53 boxes	20.2	105	250	135	187
Cushions (Casablanca)	Bale		23.3		310		168
Cutlery (France)	Wood box		5.3		145		81
Do	do		2.7		158		38
Do	do		3.4		177		43
Cuttlefish bone (Marseille-North Africa)	do		3.4		37		208
Dagga (South Africa)	do				165		80/90
Damask, cotton, table. (See Tablecloths, cotton.)							
Damask linen, piece goods. (See Linen.)							
Damar. (See Gum, damar.)							
Dari seed. (See Seeds.)							
Dates	do	None	1.2	8	80	72	34
Do	do	do	.8	5	42	37	43
Dates (specified):							
Dry	do						45
Pressed	Basket	None					45/46
Wet	Wood box						40
Deer skins. (See Skins.)							
Dextrine	Bag	None	5.1		230		50
Dhall	do	do					50/51
Dibutyl phthalate	Steel drum, ICC-5, 110-gal	do	24.6	165	1,065	900	52
Do	Steel drum, 5-gal	do	1.0	5	48	43	47

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Divi-divi:							
Curacao	Bag	None	6.7		123		121
Do	do	do	5.2		92		128
India	do	do			100		95/115
Dog food, dried (Argentina)	Bale						60
Dragon's blood, gum. (See Gums.)							
Drugs:							
Crude (England)	Wood box		1.9		65		66
N. o. s. (France)	do		14.9		353		95
Dry colors (Genoa-Leghorn)	Cask		10.7		335		70
Dry earth, paint. (See Mineral earth pigments.)							
Drygoods, n. o. s. (England)	Wood box		29.7		210		277
Dry leaves. (See Leaves.)							
Durra (Turkish millet). (See Seeds, Millet.)							
Earthenware:							
Assorted (England)	Wood cask	Packing material	51.0	224	1,288	1,064	90
Do	Wood crate	do	63.4	238	1,274	1,036	112
Do	do	do	56.2	224	1,120	896	112
Do	Wood cask	do	51.0	224	812	588	140
Do	Wood crate	do	17.5	108	579	471	68
Do	do	do	31.4	146	579	433	124
Do	Wood cask	do	32.7	140	364	224	204
Assorted (Japan)	Wood box	do	15.4	104	250	146	140
Do	do	do	12.3	91	155	64	172
Assortment, hotel (England)	Wood crate	do	45.9	196	1,680	1,484	61
Do	do	do	37.9	184	1,372	1,188	62
Do	do	do	49.2	224	1,372	1,148	80
Do	do	do	39.7	194	1,008	814	90
Do	do	do	29.0	160	700	540	93
Cookie jars (Japan)	Wood box	Packing material, 5 doz	19.7	101	240	139	187
Do	do	Packing material, 4 doz	21.7	121	310	189	160
Do	do	do	22.2	146	290	144	172
Cups (England)	Wood crate	do	45.2	196	952	756	107
Do	do	do	44.6	196	840	644	118
Cups and jugs (England)	do	do	49.2	224	980	756	112
Cups and saucers (England)	do	do	62.6	230	1,084	854	132
Do	do	do	58.6	212	962	750	140
Do	do	do	44.6	196	812	616	124
Dinner set, 54 pieces (England)	do	do	37.9	182	630	448	132
Dinner set, 53 pieces (England)	do	do	41.3	196	770	574	118
Do	do	Packing material	37.9	182	630	448	132
Do	Wood cask	do	42.9	196	630	434	149
Dinner set, 50 pieces (England)	Wood crate	do	28.2	168	560	392	112
Dinner set, 23 pieces (Japan)	Wood box	18 sets	17.1	100	260	160	149
Do	do	Packing material, 12 sets	10.6	102	200	98	118
Mugs (England)	Wood cask	Packing material	47.0	196	644	448	160

Plates (England)	Wood crate	do	40.1	192	1,232	1,040	72
Do	Wood cask	do	42.9	196	868	672	112
Do	Wood box	Packing material, 24 doz	9.3	63	270	207	77
Plates and bowls (England)	Wood crate	Packing material	34.0	176	952	776	80
Do	do	do	42.0	196	868	672	107
Plates and mugs (England)	do	do	52.1	224	1,288	1,064	90
Plates and soup bowls (England)	do	do	29.2	192	1,428	1,236	46
Plates, hotel (England)	do	do	44.6	196	1,736	1,540	57
Do	do	do	33.7	176	1,330	1,154	57
Do	do	do	37.5	192	1,288	1,096	66
Range sets (Japan)	do	Packing material, 6 doz	13.2	113	230	117	132
Do	do	Packing material, 5 doz	13.8	97	210	113	140
Refrigerator sets (Japan)	Wood box	Packing material, 4 doz	15.0	53	360	307	93
Do	do	do	15.0	94	370	276	90
Sugars and creamers (Japan)	do	Packing material, 12 sets	16.7	84	210	126	172
Do	do	do	9.7	67	130	63	172
Do	do	Packing material, 9 sets	12.7	85	180	95	160
Do	do	Packing material, 8 sets	14.3	90	180	90	172
Teacups and saucers (England)	Wood crate	Packing material	49.2	224	1,344	1,120	83
Do	do	do	53.9	224	980	756	124
Do	Wood cask	do	42.9	196	483	287	204
Teapots (Japan)	Wood box	Packing material, 12 doz	10.7	63	135	72	172
Do	do	Packing material, 9 doz	21.1	95	230	135	204
Do	do	Packing material, 8 doz	26.8	124	280	156	224
Do	do	do	20.2	86	200	114	224
N. o. s. (Leghorn)	Wood box		8.9		130		152
Do	do		20.6		242		185
Ebony							54
Egg:							
Albumen. (See Albumen.)							
Yolk, dried (Tientsin)	Wood box	2 tins, 100 lbs. each	7.0	32	232	200	68
Do	do	do	8.0	42	242	200	74
Eggs:							
Australia	Wood crate		2.7		71		86
China	do						102/105
Denmark	Wood box						105
Egypt	do		7.7		106		90
Eggs (specified):							
Desiccated (China)	do						70/75
Frozen	Cylindrical tin can	None	1.6	2	32	30	112
Eggplant (Piraeus)	Wood box		2.0		104		43
Elastic (Genoa)	do		16.2		392		95
Embroideries (Italy)	do		19.9		273		163
Embroidery, cotton (Genoa)	do		17.0		216		176
Enamelware, plates. (See Plates.)							
Ergot	Steel drum	None	9.0	10	115	105	172
Esparto grass:							
Algeria	Bale	do					110/140
South Spain	do	do					130
Tripoli	do	do					100/130
Tunis	do	do					120/140

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Essence, Geranium (Algiers)	Drum		12.0		565		60
Do	do		16.4		706		52
Do	do		12.0		565		48
Do	do		16.4		706		51
Essence, Orange (West Africa)	do	None					80
Essential oil. (See Oil.)							
Fans:							
Chinese	Wood box		5.2		36		287
Japanese	do		4.6		27		370
Feathers, crude, duck and goose	Bale	None	8.8	10	420	410	47
Feathers, n. o. s. (China)	do	do	9.7		206		106
Felt (Palestine)	do		13.6		150		204
Felt hat bodies, wool	Cloth bale	None	10.0	8	154	146	149
Do	do	do	8.0	6	99	93	187
Do (Marseille)	do		8.3		106		176
Felt hats (France)	Wood box		60.7		255		533
Do	do		48.4		198		547
Fennel seed. (See Seeds.)							
Fescue seed. (See Seeds.)							
Fiber. (See under specific name.)							
Figs, dried	do	None	.2	3	13	10	39
Do	do	48 pkgs., 8 oz. each	.5	4	28	24	38
Fire crackers (China)	do		1.4		43		76
Do	do		4.0		100		88
Fish (see also under specific name):							
Cakes, canned	do	24 cans	1.8	16	77	51	52
Manure (Japan)	Bale	None					60/65
Pickled	Wood barrel	do	6.4	41	290	200	50
Do	do	do	3.7	30	165	100	51
Do	do	do	.4	2	16	9	51
Preserved:							
Genoa	Bundles, 2 cases each	do	.6		24		54
Do	Wood box		.7		26		57
Istanbul	Crates, 1 barrel each		3.3		77		97
Do	Wood box		2.5		99		57
Do	do		4.3		154		62
Do	Crates, 2 cans each		3.7		88		93
Preserves (France)	Wood box		1.7		65		57
Sounds (Maracaibo)	Bag	None	16.1		255		148
Flax (specified):							
Dumped (Australia)	Bale	do					82
Undumped (Australia)	do	do					135
Unpressed (Baltic)	do	do			448		155
Flax:							
Africa	do	do	15.0		350		95/100
New Zealand	do	do	14.0		290		106

Flax, fiber:							
Dressed	Cloth bale	do	18.6	25	625	600	66
Do	Matting bale	do	10.6	6	226	220	107
Do	Cloth bale	do	9.5	5	225	220	93
Raw	do	do	11.4	3	353	350	72
Do	Cloth bag	do	8.9	2	222	220	90
Flaxseed. (See Seeds.)							
Fleshings (Argentina)	Bale	do			125		80
Flour (see also under specific name):							
Australia	Bag	do	5.0		200		56
Trieste	do	do					52/53
United Kingdom	do	do			130		50
Do	do	do			256		55
Flower bulbs. (See Bulbs.)							
Flowers, artificial (France)	do		41.8		285		320
Do	do		30.7		176		389
Do	do		65.8		359		410
Do	do		42.7		221		433
Flowers, cactus (Marseille)	Bales		6.1		46		298
Flowers, mowra							40/42
Flower water (Beirut)	Wood box		6.3		85		168
Fluorspar, ground	Wood barrel	None	6.9	22	522	500	30
Do	Cloth bag	do	1.3	1	126	125	24
Fork heads, assorted	Wood box	do	7.8	40	335	287	52
Forks and heads, assorted	do	do	10.3	63	483	420	48
Forks, spading and manure, assorted	do	do	9.9	56	477	422	47
Fruit, canned	do	Cans	1.3		60		50
Fruit, dried (Australia)	do		1.3		60		50
Fruit, preserved (France)	do		9.6		340		63
Do	do		9.8		310		71
Do	do		11.5		360		71
Do	do		3.5		74		105
Fruit preserves (Haifa)	Wood box		1.2		55		49
Fruit pulp:							
Casablanca	do		2.7		128		48
Oran	Crates, 10 cans each		3.3		121		62
Fur skins (Italy) (see also Skins)	Wood box		17.3		257		150
Do	do		39.2		186		470
Do	Bales		16.7		260		143
Pelts, pickled:							
Australia	Wood cask	None	28.5		1,125		57
New Zealand	do	do	25.9		920		63
Fur waste fertilizer (Australia)	Bale	do	30.5		400		171
Furniture, n. o. s. (Italy)	Wood box		58.0		623		208
Fusel oil. (See Oil.)							
Fustic, extract	Wood barrel	None					47/50
Do	do						38
Fustic, roots. (See Roots.)							
Galangal	Bag		7.8		113		90/95
Do	Basket						120
Galena (lead ore). (See Ores and concentrates.)							
Galliver. (See Ores and concentrates.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Gambier	Bag	None	5.5		162		80
Do	Basket						115/120
Do	Wood box		8.0		432		42
Gambier (Java)	Bag	None					80/90
Gambier extract	Wood box		8.2		525		35
Gamboge	do						65/70
Garbanzos (Mexico)	Bag	None	6.3		210		66
Garlic	Wood box						80
Gelatin, inedible sheet	Wood barrel, paper liner	None	10.4	44	270	226	86
Do	Cloth bag, cardboard liner	do	9.3	5	140	135	149
Do	do	do	3.9	2	114	112	77
Gentian root. (See Roots.)							
Geranium essence. (See Essence.)							
Ghee	Wood box	Tins					50/57
Do	Half case						55/58
Do (Calcutta)	Wood box		2.2		96		50
Gherkins in brine (Patras)	do		1.9		101		42
Gingelly (sesame). (See Seeds.)							
Ginger (specified):							
Dried	do						80
Root. (See Roots, ginger.)							
Ginger:							
India	Bag	None			100		90
Japan	Package		5.7		146		88
West Africa	Bag	None					95
Ginseng	Wood barrel	do	16.5		266		140
Do	do	do	17.0		249		153
Do	do	do	13.5		239		128
Ginseng fiber	Wood keg	do	16.0		257		140
Do	Wood barrel	do	15.0		197		171
Do	do	do	12.0		191		140
Ginseng root. (See Roots, ginseng.)							
Glass:							
Lenses (France)	Wood box		6.0		152		88
Do	do		10.4		218		106
Do	do		5.9		214		61
Do	do		12.3		236		116
Lenses:							
Opera (France)	do		17.5		468		83
Watch (France)	do		5.4		148		82
Do	do		4.7		189		56
N. o. s. (France)	do		27.1		990		61
Glass enamel, fusible rods	do		7.7	66	286	220	61
Glass frostings	do	Paper bags	4.9	23	328	300	33
Do	do	do	3.2	20	249	225	29
Do	do	do	2.5	15	167	150	33

Glass sheet, single strength:							
Size 12″ x 20″	Wood crate, packing material	30 lights, 50 sq. ft	1.2	15	71	56	37
Size 14″ x 28″	do	18 lights, 50 sq. ft	1.4	19	68	49	47
Size 14″ x 32″	do	16 lights, 50 sq. ft	1.4	16	76	60	41
Size 28″ x 32″	do	16 lights, 100 sq. ft	3.3	38	136	98	55
Glassware:							
Blown and pressed (Bohemia)	Wood box	Packing material	18.0	144	328	176	124
Common:							
France	do		5.2		253		45
Do	do		12.9		217		133
Do	Barrels		27.0		699		86
Do	Cask		21.9		108		247
Do	do		38.9		497		440
Do	do		39.6		312		284
Italy	Wood box		8.7		84		231
Do	do		13.9		118		264
Do	do		18.1		165		245
Do	do		18.1		156		259
Fine (Italy)	do		5.3		250		47
Do	do		6.3		211		66
Do	do		6.7		375		40
Do	do		8.4		314		60
Do	do		5.1		231		49
Do	do		7.6		167		101
Do	do		5.7		133		95
Do	do		3.9		151		58
Gloves (France)	do		40.3		460		194
Do	do		11.3		158		159
Do	do		12.3		92		295
Do	do		21.3		242		194
Do	do		13.2		143		203
Do	do		23.9		245		237
Do	do		23.2		261		199
Gloves, cotton, dress, 150 doz	do	300 boxes	35.2	59	284	150	280
Gloves, rayon, 321 ½ doz	Fiber carton	537 boxes	38.2	133	476	241	187
Glue (Constanza)	Bag	None	3.8	114			75
Glue:							
Powder (Marseille)	do	do	3.3	115			65
Sheet bone (Brazil)	do	do					85/90
Sheets (Marseille)	do	do	5.3	115			104
Stock (England)	do	do	6.8		117		131
Do	Bale	do	30.0		600		112
Do	Bale, loosely packed	do	38.5		563		151
Do	Wood barrel	do	9.0		300		60
Strip (River Plate)							100/110
Glycerin	Steel drum	None	20.9	210	1,310	1,100	36
Do	do	do	20.9	210	1,210	1,000	39
Goat skins. (See Skins.)							
Gold slag. (See Ores and concentrates.)							
Gram (India)	Bag	do			448		50
Grapes, fresh	Wood box	Packing material	.8	4	24	20	70
Graphite. (See Minerals.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Greave cakes (River Plate)	Bag	None					60/65
Guano	Bulk						40/42
Do	Bag	None					42/44
Do	do	do	3.6		141		57
Guinea corn. (See Durra.)							
Gum:							
Acacia. (See Gum, Arabic.)							
Arabic	Wood barrel	do	9.5		310		69
Do	Bag	do	5.6		225		56
Do	Cloth bag	do	5.6	2	225	223	56
Do	Wood box	do	2.0		63		71
Calcutta	Bag	do	5.7		228		56
France	do	do	5.3		223		53
Marseille	do	do	4.7		218		48
Senegal	do	do	4.4		202		49
West Africa	do	do					75
Arabic (type):							
Cleaned amber sorts	Cloth bag	do	6.3	4	224	220	62
Fine grained	do	do	3.0	4	204	200	33
Powdered	Wood barrel, 2 paper liners	do	8.8	26	326	300	61
Carob (Cyprus)	Bag	do	8.2		222		82
Copal (West Africa)	do	do					75
Do	do	do	6.0		179		75
Do	Wood box		7.2		220		75
Dammar	do		7.2		230		72
Dragon's blood	do						85/90
Ester. (See Resin, synthetic.)							
Gutta	Basket						68/75
Do	Bag						80/85
Gutta percha, cleaned	Wood box		6.2		291		48
Do	Wood barrel	None	9.5		261		82
Do	do	do	9.0		249		81
Do	Bag	do					88
Do	Basket	do	1.7		61		65
Do	Wood box		5.8		183		80
Compound	Wood barrel	None	8.9		257		78
Kalera (Bombay)	Basket	do	5.3		174		68
Karage (Bombay)	do	do	4.7		188		55
Kauri	Wood box		8.0		280		64
Do	Bag	None	6.0		170		90
Karaya	Wood box		2.2		75		66
Crude	Bag	None	4.0		105		85
Powdered	Wood barrel	do	9.6		330		66
Lakoe	do		3.8		228		37
Nispero	Bag	None	2.9		190		34
Opium	Wood box	do	4.1	39	198	150	47

Perillo	do	do	3.2		165		44
Sandarac (Casablanca)	Barrel		12.3		356		77
Do	do		10.1		324		71
Senegal. (See Gum, Arabic).							
Tragacanth	Wood box		12.0		203		132
Do	Bag	None	6.0		174		77
Do	Wood box	do	10.5		165		142
Tragasol	Bag	do	5.1		111		101
Tragasol carob, flour only	Cloth bag	do	5.1	4	114	110	102
Yacca (Australia)	do	do	4.0		150		59
N. o. s. (Marseille)	Bag	do	4.7		218		48
Gunnies	Bale	do	28.0		1,091		57
Calcutta	do	do					50
Gutta Percha. (See Gum.)							
Gypsum	Bag	do					43
Haberdashery (France)	Wood box		39.9		445		199
Do	do		27.3		376		162
Do	do		71.4		770		207
Hair, animal (see also Wool-like hair):							
Cattle	Bale	None	32.0		570		126
Compressed	do	do	27.0		510		110
Do	Bundle	do	15.3		208		160
Goat, in grease							90
Horse:							
Buenos Aires	Bale	None	35.3		933		85
Pressed	do	do					140/160
Unpressed	do	do					350/360
Rabbit	Bale	do			360		210
Hair, human	Wood box		5.5		156		80
Hairnets (France)	do		32.4		301		241
Do	do		31.7		295		241
Do	do		45.6		457		223
Handkerchiefs (France)	do		20.3		380		119
Handkerchiefs, cotton:							
England, Men's, 390 doz	do	Cartons	17.7	172	366	194	107
Germany, Men's, 1,080 doz	do	do	18.3	159	223	64	187
Ireland, 540 doz	do	do	7.2	71	124	53	132
Ireland, Ladies', 800 ½ doz	do	do	20.8	180	434	254	107
Ireland, Ladies', 4,000 doz	do	do	24.0	114	554	440	97
Japan	do	Boxes	24.6	102	361	259	149
Switzerland, 579 ¼ doz	do	Cartons	18.6	130	163	33	249
Switzerland, 885 ½ doz	do	do	22.7	180	242	62	204
Handkerchiefs, cotton and linen:							
Assorted	do	Boxes	19.8	100	386	279	112
Do	do	None	20.1	158	298	140	149
Assorted (Puerto Rico)	do	Wrapping	23.8	88	409	291	132
Handkerchiefs, linen (North Ireland)	do	Cartons	20.1	76	443	360	102
Ladies', 1,500 doz	do	do	18.7		336	205	124
Ladies', 497 ⅚ doz	do	do	9.7		160	90	140
Ladies', 2,897 ½ doz	do	do	30.8		392	259	172
Hat bodies, felt. (See Felt.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Hay:							
Ordinary pressed (Algeria)	Bale	None					200/270
Hyd. (high density) pressed (Algeria)	do	do					130/145
Hay (New Zealand)	do	do	6.7		75		180/190
Hay (River Plate)	do	do					150/160
Hazelnut kernels. (See Nuts.)							
Heliotropin	Wood box		6.8		105		145
Hematite (Iron ore). (See Ores and Concentrates.)							
Hemp:							
Africa	Bale	None					90/115
Australia	do	do	8.0		224		80
Calcutta	do	do					70/90
Italy	do	do					120/130
Manila	do	do	12.0		280		95
Mombasa	do	do	10.0		224		90/100
New Zealand (phormium)	do	do	24.0		448		90/120
Do	do	do					90/100
Philippines	do	do	13.5		279		108
U. S. S. R.	do	do					80/120
Hemp (see also Hessian):							
Braid (Manila)	do	do	17.3		317		122
Do	do	do	18.4		315		131
Do	do	do	19.6		310		141
Cordage	Cloth bale, paper liner	do	5.9	4	224	220	59
Fiber, line	Cloth bale	do	11.7	5	405	400	64
Fiber, raw	Bale	do	39.1	2	702	700	124
Twine (Genoa)	do		4.8		137		77
Hempseed. (See Seeds.)							
Henequen. (See Sisal.)							
Herbs, dried, n. o. s	do	None	16.0		187		192
Herring:							
Canned	Wood box	100 cans	2.2	13	97	62	52
Do	do	do	1.5	13	70	40	47
Do	do	do	1.1	8	44	21	53
Pickled or salted	Wood tierce	Brine and salt	11.8	48	550	400	48
Do	do	do	7.1	32	330	250	48
Do	do	do	3.7	20	170	125	48
Tinned (England)	Cartons		.5		17		66
Hessian:							
Burlap (Calcutta)	Bale	None	21.9		990		50
Jute (Calcutta)	do	do					48/50
Do	do	do	22.8		1,078		48

Hides:							
Dry:							
Australia	do	do	13.7		625		49
Bahia					24 lbs.ea.		160
Buenos Aires					35 lbs.ea.		250
Capetown	Bale	None	40.0				160
West Africa	do	do					150
Dry:							
Buffalo hides	Bundle	do					75
Do	Bale	do	35.0		1,000		80/100
Salted:							
Dry (Para)							90
Frigorifico (River Plate)							42
Green	Bundle	None	.7		47		32
Matadero (River Plate)							42
Wet:							
Australia	Bag	None	4.8		180		60
Philippines	do	do	3.4		190		40
Salted (River Plate)	Bundle	do					44
Do	do	do					48
N. o. s.:							
Calcutta	Bale	do					80/90
East Africa	do	do	18.0		350/550		100
Hollands, window	Wood box	On forms wound in cloth	19.8	97	713	584	62
Do	do	do	12.2	73	527	432	52
Honey	Wood barrel	None	13.2		651		45
Hoop	Bag	do	6.0		40		336
Hops, double compressed (Chile)	Wood box		30.0		556		122
Hops (Mazatlan)	Bale	None	20.0		208		215
Horns and hoofs	Loose						90/95
Do	Bag	None					100/120
Horn shavings and tips	do	do					70/75
Horn tips	do	do	5.3		172		69
Do	do	do	5.0		170		66
Horseshoes	Wood keg	do	1.5	10	110	100	31
Hosiery:							
Cotton, men's	Wood box	25 cartons, 4 doz. each	11.3	80	287	184	90
Do	do	228 boxes, ½ doz. each	18.1	73	220	100	172
Do	Cloth bale	25 cartons, 4 doz. each	8.1	11	218	184	86
Woolen	Wood box	Boxes	34.0	107	426	214	172
Do	do	238 boxes, ½ doz. each	25.4	106	324	150	172
England	do		28.7		364		176
Do	do		28.7		336		191
France	do		8.7		106		173
Woolen, men's golf	do	151 boxes, ¼ doz. each	20.2	67	238	124	187
Ilmenite ore. (See Ores and concentrates.)							
Indigo	Keg	None	5.7		171		85
Indigo (Calcutta)	Wood box		10.2		371		61
Do	Seroon	None	4.7		165		64
Do	do		5.0		162		69

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Instruments, mechanical drawing	Wood box	None	10.1	99	453	354	50
Do	do	do	5.1	49	198	149	57
Irish moss. (See Moss.)							
Iron:							
Ore. (See Ores and concentrates, Hematite.)							
Oxide (England)	Bag		2.0		114		39
Do	do		2.0		113		40
Pig (Calcutta)							12
Sulfate (copperas)	Wood barrel	None	10.0	25	425	400	52
Istle fiber	Bale	do	6.8		206		75
Do	do	do	9.7		246		88
Mexico	do	do	13.9		284		110
Do	do	do	13.8		254		122
Ivory	Loose or bundles						28/32
Ivory nuts. (See Nuts.)							
Ivory scrap	Wood barrel	None	6.5		200		75
Ivory, vegetable. (See Nuts, ivory, tagua.)							
Jaggery	Bag	do	3.0		168		35/40
Jarrah wood (Australia)	Logs						30/38
Jelutong	Wood box		10.0		350		65/70
Jowari seeds. (See Seeds.)							
Juniper berries (Leghorn)	Bag	do	7.4		132		126
Jute (unspecified)	Bale	do	10.0	5	405	400	55
Do	do	do	9.7		400		55
Do	do	do	10.3		400		58
Do	do	do	9.9	6	400	394	55
Calcutta	do	do	10.6		404		57
Do	do	do	11.6		404		61
Jute (specified):							
Burlap (England)	Rolls		46.7		1,045		100
Do	do		91.0		2,036		100
Butts	Bale	None	10.5		400		58
Cuttings	do	do	10.0		400		56
Cuttings, lashing, rejections (Calcutta)	do	do					65
Fiber	do	do	12.0	5	405	400	66
West Africa (Urena lobata)	do	do					120
Linen (Genoa)	do		31.7		1,014		69
Waste	do	None	49.0		590		186
Yarn. (See Yarn.)							
Kalera gum. (See Gum.)							
Kamala	do	do	2.5		113		49
Kaoliang (millet) (Dairen). (See Seeds, millet.)							
Kapok:							
Brazil	do	do					130
India	do	do					130/150

Java	do	do	12.7		217		130
Do	do	do	16.2		205		177
Do	do	do	11.8		233		114
Semiarango	do	do					114
Do	do	do	16.0		185		190
Soerabaya	do	do					147
Karite nuts (West Africa). (See Nuts.)							
Kauri gum. (See Gum.)							
Kieselguhr							230
Kimono, embroidered	Wood box	40 boxes, 1 doz. each	17.2	40	282	222	140
Knitwear, wool, infants' (Japan)	do	Boxes	15.3	106	169	63	204
Kola nuts. (See Nuts.)							
Lac, crude, seed, button (stick or shell)	Wood box, cloth liner	None	9.4	41	230	189	90
Do	Cloth bag	do	7.1	3	167	164	93
Lace, bobbinet	Wood box	Boxes	41.9	90	639	190	149
Laces, silk	Fiber carton	None	2.0	3	16	13	280
Do	do	do	1.0	3	12	10	187
Do	do	do	1.4	2	9	7	320
Laces (France)	Wood box		24.3		282		192
Do	do		53.9		634		190
Do	do		46.3		478		216
Do	do		55.0		626		196
Do	do		31.8		383		186
Do	do		51.7		563		206
Do	do		42.5		449		211
Do	do		38.9		299		291
Latex. (See Rubber.)							
Lead acetate (sugar of lead)	Wood cask, paper liner	None	12.7	34	586	552	49
Lead bars (Australia)	Piece		.4		90		11
Lead ingots (South and East Africa)							8
Leather:							
Calf	Wood box	Paper wrapped	20.6	45	291	245	160
Calf and kip, lining	Cloth bale	do	12.3	5	381	375	72
Calf, upper	Wood box, paper liner	None	36.1	118	642	524	124
Do	do	do	20.4	84	337	253	140
Do	do	do	6.0	36	112	76	118
Leather goods, n. o. s.:							
England	Wood box		22.7		251		202
Italy	do		20.3		357		127
Do	do		16.0		205		175
Do	do		7.0		108		145
Leather works (Leghorn)	do		4.1		66		139
Leaves:							
Bay	Bale	None					130
Buchu	do	do					250
Cacao	do	do					250
Coca	do	do	23.5	7	587	580	90
Do	Wood box, tin lined	do	4.3	19	147	128	66
Common (Leghorn)	Bale		24.6		397		138
Dry (Marseille)	do		13.0		174		169
Do	do		10.2		138		164

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Leaves—Continued.							
Laurel (Patras)	Bale		11.2		132		190
Do	do	None	14.5		140		232
Patchouli	do	do					120/150
Senna	do	do					120/150
Do	do	do	35.8	10	400	390	204
Do	do	do					115/125
Stramonium	do	do	36.0	6	206	200	373
Usa ursinas (Genoa)	do		7.5		110		150
Lemons, fresh	Wood box	None	2.7	11	88	77	68
Messina	do		3.0		80		84
Sorrento	do		2.7		62		99
Lemon peel	Wood cask	None					65
Lenses, glass. (See Glass lenses.)							
Lentils	Bag	do					50
Licorice extract	Wood box		4.9		289		37
Do	Drum	None	4.2		130		72
Do	Fiber carton		.8		54		33
Lignum vitae							45/60
Logs	Each		1.3		44		64
Do	do		1.4		73		43
Lime juice	Puncheon	None					40
Limes	Wood crate	do	2.3		88		69
Jamaica	Wood barrel	do	8.4		170		110
Linen (see also under specific article):							
France	Bales		26.4		419		143
Cloth, crash, 60 pieces	Wood box	None	15.6	125	635	510	55
Cloth, crash (North Ireland)	do	do	12.0	75	483	408	56
Cloth	do	Drum boards	27.2	132	511	351	118
Damask, piece goods (Scotland)	do	Paper wrapping	20.2	75	701	624	64
Jute. (See Jute.)							
Yarn. (See Yarn, linen.)							
Linoleum (England)	Roll		9.3		389		53
Do	do	Wood core	13.5	18	532	499	57
Linseed. (See Seeds.)							
Linseed cake. (See Oilcake.)							
Lithopone	Wood barrel	None	10.3		450		56
Lobster tails, frozen	Wood box	do	.9	5	35	30	61
Locks, luggage (England)	do	Boxes	7.9	37	431	370	41
Do	do	do	6.1	34	252	205	54
Locust bean:							
Limassol	Bags		4.5		141		72
Carobs (Cyprus)	Wood box		6.5		68		214
Carobs (Limassol)	do	Boxes	7.3		145		112
Locust-bean meal. (See Meal.)							

Logwood:							
Straight (Jamaica)							140
Split root (Jamaica)							155
Unsplit root (Jamaica)							190
Lupins (Algiers)	Bag		4.0		110		81
Mace (Netherlands East Indies)	Wood box		6.4		179		80
Do	do		4.8		87		124
Do	do		5.2		125		93
Machines:							
Engraving (Italy)	do		54.9		1,145		108
Testing (Italy)	do		63.9		1,212		118
N. o. s. (Spain)	do		125.1		3,895		72
Madder	Bale	None	10.1		728		31
Do	Wood box						65
Do	Bale	None					55/80
Magnesium hydroxide	Wood box, paper liner	do	4.3	17	117	100	83
Magnesite, fine	Bulk						16
Do	Bag	None			100		47
Magnesite, caustic calcined	Wood cask	do	13.0	44	664	620	44
Mahogany (West Africa)							100/110
Mahogany logs:							
Honduras							27
Spain							44
Mahogany logs:							
Square							30
Solid							34
Maize:							
Calcutta	Bag	None					60
South Africa	do	do					50/60
Do	Bulk						50/53
East Africa	do						48/50
River Plate	do						49
Sulina	Bag	None					50/53
Majolicas:							
Genoa	Wood box		12.0		238		113
Do	do		18.7		174		241
Do	do		11.3		93		271
Leghorn	do		30.9		223		309
Italy	do		11.7		144		181
Do	do		13.3		128		232
Do	do		11.7		86		304
Do	do		2.3		103		50
Do	do		11.0		115		214
Do	do		13.3		182		164
Malangas	Bulk						47/52
Cuba	Wood barrel	None	9.1		240		84
Dominican Republic	Bag	do	5.2		160		73
Mallet bark							90
Madioca flour (Brazil)	Bag	None			219		61
Mandioca starch (Brazil)	do	do					65/70
Manganese ore. (see Ores and concentrates.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Mangrove bark	Compressed bale	None					45/55
South Africa	Bag	do					85
East Africa	do	do	6.2		160		90
Manioc	Wood box		17.9		425		94
Marble	Block						14/17
Do	Wood crate						19/20
Argentina	Block						740
Marjoram	Bale	None					220/230
Marmalade (Haifa)	Wood box		1.1		51		48
Matting (Canton)	Roll						130/160
Mattings, cocoa fiber	Cloth roll	None	14.1	2	102	100	320
Mats (China)	Bale	do					188
Mats, cocoa fiber	Cloth bale	do	7.5	2	92	90	187
Matzoths (Haifa)	Wood box		15.8		206		171
Do	Carton		4.9		46		240
Matzoths flour (Haifa)	Bag	None	6.7		251		60
Meal:							
Castorseed (Brazil)	do	do					65
Corn (River Plate)	do	do					60
Cottonseed	do	do					55/65
Do	do	do					65/70
Brazil	do	do					55
Turkey	Bulk						100
Liver (River Plate)	Bag	None					60
Locust bean	do	do					80
Soybean	do	do	5.7		175		75
Coarse ground (Dalren)	do	do			162		65
Fine ground (Dairen)	do	do			175		55
Sunflower (Argentina)	do	do					60
Meat:							
Dried (River Plate)							66
Extract (River Plate)							45
Frozen (River Plate)							90
Prepared (River Plate)	Wood box						60
Medicinals (Italy)	do		5.0		111		101
Do	do		9.7		132		165
Mercuric chloride (corrosive sublimate)	Wood box, paper liner	4 pkgs., 28 lbs. each	1.4	18	130	112	24
Mercury (quicksilver)	Flask	None	.2		90		5
Do	do	do	.3		98		6
Metallic calcium (Marseille)	Wood box		4.8		159		68
Mica. (See Minerals.)							
Middlings	Bag	None	6.7		224		66
River Plate	do	do					110
Milk powder (Italy)	Wood box		1.3		54		52

Milk, powdered (see also Nestle food products):							
Marseille	Wood box		1.8		50		82
River Plate	do						80
Millet. (See Seeds.)							
Minerals (see also under specific name and "Ores and concentrates"):							
Asbestos	Bag	None					60/70
Capetown	do	do					70
Beira	do	do					85
East Africa	do	do					80/90
Limassol	do	do	3.4		99		78
Asbestos, rock bulk	do	do					56
Asbestos, crude	Cloth bag	do	1.6	1	101	100	34
Corundum:							
Calcutta	Bag	do					39/42
South Africa	do	do	3.4		152		50
Graphite (plumbago)	Bag, rope tied	do	2.3		133		33
Do	Wood barrel	do	12.5		568		46
Do	do	do	15.6		624		56
Do	do	do	15.2		758		45
Amorphous	do	do	16.8	75	725	650	52
Do	Cloth bag	do	4.0	2	205	201	44
Flakes	do	do	5.3	4	200	196	59
Mica:							
Brazil	Wood box						55
India	do		2.2		130		38
West Africa	do						60
Mica splittings	Wood box, liner	None	2.6	15	140	125	42
Do	do	do	1.9	14	126	112	33
Do	do	Paper wrapper	1.7	15	115	100	33
Block or book	do	do	1.7	12	112	100	34
Saltpeter (Calcutta)	Bag	None					35
Do	do	do	2.7		183		36
Do	Bulk						35/36
Mineral earth pigments:							
Dry earth paint (Larnaca)	Bag	None	5.7		233		55
Do	do	do	5.5		211		58
Sienna earth	do	do	5.7		217		59
Do	Wood cask	do	23.3		609		85
Do	do	do	15.9		692		52
Leghorn	Barrel		9.5		386		55
Do	Bag	None	5.1		210		54
Umber, raw powdered (Alexandria-Larnaca)	Cask		8.2		308		60
Do	do		13.4		772		39
Mineral water (Leghorn)	Crate		5.3		220		54
Mohair. (See Wool-like hair.)							
Monazite sand	Cloth bag	None	2.5	1	113	112	50
Moss, Irish	Cloth bale	do	13.2	2	223	221	132
Mother-of-pearl shell (Australia)	Wood box		5.3		300		40
Do	do		7.7		334		52
Mowra flowers. (See Flowers.)							
Mowrah seeds. (See Seeds.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Mushrooms, preserved (France)	Wood box		1.6		111		32
Musical instruments (France)	do		26.3		289		204
Do	do		20.1		171		263
Do	do		17.4		182		214
Do	do		8.7		59		332
Do	Carton		7.3		90		182
Musical instruments (Italy)	Wood box		6.2		246		56
Do	do		5.3		257		46
Do	do		8.5		213		89
Do	do		5.3		257		46
Do	do		20.9		306		153
Music works (Italy)	do		5.9		243		54
Do	do		16.7		451		83
Do	do		15.4		428		81
Mustard seed. (See Seeds.)							
Mustard oil. (See Oil.)							
Myrobolans (Calcutta)	Bag	None	4.5	2	180	178	56
Do	Pocket	do	1.8		57		68/73
Do	do	do	2.1		57		99
Napkins, linen	Wood box	25 cartons, 300 doz. each	9.7	90	690	600	32
Naphthalene, crude	Cloth bag	None	6.5	4	228	224	64
Nestle food products:							
Alimento tonica (Marseille)	Wood box	250 tins	1.8		40		56
Powdered milk	do	24 tins	1.7		45		87
Tonic food	do	do	1.7		44		89
Do	do	48 tins	1.9		48		89
New Zealand hemp. (See Hemp.)							
Niger seed. (See Seeds.)							
Niger seed cake. (See Oil cake.)							
Niger seed oil. (See Oil.)							
Night light tins (Naples)	do	do	5.1		190		60
Nispero gum. (See Gum.)							
Nitrate of soda	Bulk						26
Do	Bag		3.2		215		35
Nuts:							
Areca	do	None	2.2		100		49
Babassu:							
Brazil	do	do	2.3	2	133	131	39
Para	do	do					70
Brazil	Wood box				66		70
Do	Bulk						100
Do	Bag	None	8.0		185		96
Do	do	do	6.0		160		90
Do	do	do					90
Calabar (West Africa)	do	do					70
Cashew (South Africa)	do	do					73

Chestnuts	Wood box	do	4.7	23	132	100	80
Fresh	Wood barrel	do	5.6	14	134	120	93
Do	Basket	do	3.5	10	120	110	66
Port (China)	Bag	do					180/200
Do	Wood box						120/125
Coconuts	Bag	None	5.3		130		100
Do	Bulk						140
Coconuts (Puerto Rico)	do	None	6.0		170		79
Do	do	do	6.5		160		91
Coquilla	Bag	do					55/65
Coquito	do	do	4.8		155		70
Corozo	do	do					55/65
Filberts (Leghorn)	Keg		5.3		132		90
Gallnuts	Wood box		9.0		280		70
Beirut	Bags		9.3		196		107
Do	do		7.3		192		88
South China	Wood box						90
Goora. (See Nuts, Kola.)							
Groundnut kernels (Dairen)	Bag	None			172		68/70
Hazelnut kernels (Istanbul)	do		5.3		176		69
Ivory (tagua)	do		6.1		211		64
Do	do	do	3.2		127		56
Do	do	do	5.2		225		52
Karite (West Africa)	do	do					70
Kola	do	do	5.2		197		60
West Africa	do	do					75
Central America	do	do	4.2		220		43
Palm kernels (West Africa)	do	do					70
Pignolia	Wood Box		5.5		154		80
Pistachio	do						72
Walnuts (China)	Bag	None	5.0		102		100
Nuts, shelled:							
Almonds (Sicily)	2 cases, in 1 bundle		1.9		68		63
Almonds, natural	Wood box	None	1.0	7	35	28	66
Arachides (monkey nuts)	Bag	do					70
Brazil	Wood box	do	5.1	20	200	180	57
Do	do	2 cans, 33 lbs. each	2.0	11	84	66	55
Cashew	Wood box	2 cans, 25 lbs. each	1.7	12	68	50	56
Filberts	Cloth bag	None	5.8	4	176	172	75
Istanbul	Bag	do	5.7		176		72
Marseille	do	do	5.8		164		76
Naples	do	do	3.7		112		75
Groundnuts (Madras)	do	do			224		60/70
Pignolias	Wood box, paper liner	do	3.4	20	132	112	57
Pistachio	Wood box	4 cans	3.1	41	150	100	47
Pistachio (Beirut)	Bag		7.3		202		85
Walnuts	Wood box, paper liner	None	2.6	15	70	55	83
Do	Fiber carton	do	2.4	7	62	55	86
Walnuts (Marseille)	Wood box		2.4		70		77
Nuts, unshelled:							
Almonds	Bag	None	9.0		224		90
Do	do	do	5.0		112		109
Arachides (monkey nuts)	do	do					90/100

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Nuts, unshelled—Continued.							
Filberts:							
Istanbul	Bag	None	5.7		176		72
Leghorn	Keg		5.3		132		90
Naples	Bag	None	3.7		112		75
Marseille	do	do	5.8		164		76
Gall:							
Beirut	do	do	9.5		196		107
Do	do	do	7.3		192		88
Groundnuts:							
Dairen	do	do			83/102		180
Dakar	Bulk						95
East Africa	Bag	None	5.0		180		60/65
Gambia River, Gambia	Bulk						112/118
Salum River, Gambia	do						95/105
Pistachio:							
Sicily	Bag	None	7.3		229		70
Do	do	do	7.3		223		73
Beirut	do	do	7.1		194		81
Nutmegs:							
West Indies	do	do	6.0		200		67
Do	Wood box		2.2		67		74
Netherlands Indies	do		4.2		165		57
Do	do		4.5		158		64
Nutmegs, whole	Cloth bag	None	7.2	4	200	196	80
Nux vomica (Calcutta)	Bag	do	1.5		54		65/70
Oak extract (Argentina)	Wood barrel	do	15.0		640		50/55
Oats:							
Australia	Bulk						70
Calcutta	Bag	None					75
Do	Bulk						70
New Zealand	Bag		6.0		190		65/70
Oats (specified):							
Clipped (River Plate)	Bulk						65/68
Common	do						73
Heavy (Black Sea)	do						71
Light (Black Sea)	do						74
Unclipped (River Plate)	do						72/75
Obechi logs (West Africa)							70
Ochre (Marseille)	Paper bag		1.1		51		48
Do	Cask		15.4		632		54
Do	do		15.0		615		54
Do	do		13.3		609		49
Do	do		13.3		648		45
Ochres, ground	Wood cask	None	11.3	45	600	555	42

Offal (Argentina)	Bag	do					120/123
Oil:							
Almond	Drum	do					50/53
Bitter (Marseille)	do	do	3.2		136		52
Sweet (Marseille)	Wood box		2.0		79		56
Aniseed	Drum	None					75
Do	Wood box	Tins					50
Bergamot (Messina)	do		1.6		40		89
Camphor	Drum	None					55
Camphor (China and Japan)	Wood box		2.2		102		48
Do	do		2.2		92		53
Camphor, white (Japanese)	do	2 cans, 50 lbs. each	4.5	35	143	100	70
Castor	Steel drum	do	12.0	50	450	400	59
Castor (Brazil)	do	do					60
Chinawood (tung oil)	Steel drum, 55-gal	None	10.7	64	424	360	56
Do	Wood barrel	do					64/65
Do	Wood box	Tins					56/58
Coconut	Puncheon	None					60/70
Do	Wood cask	do					60
Do	Steel drum	do	11.0	50	450	400	55
Cod and cod-liver	do	None	10.7	55	480	425	50
Corn	do	do	12.0	50	450	400	59
Do	do	do	11.7	51	484	433	54
Cottonseed (Brazil)	Bulk						39
Do	Drum	None					60
Do	Steel drum	do	12.0	50	450	400	59
Essential (Marseille)	Drum		13.0		563		52
Flaxseed. (See Oil, linseed.)							
Fusel, refined	Steel drum	None	10.6	63	440	377	53
Geranium (Algiers)	Drum		12.0		565		48
Do	do		16.4		706		51
Lemon:							
Messina	½ case		2.6		73		80
Do	¼ case		1.6		37		97
Sicily	½ case		2.9		77		85
Do	¼ case		1.6		37		97
Do	½ case		2.6		73		80
Do	¼ case		1.3		40		76
Linseed	Steel drum	None	11.0	50	425	375	57
Do	Fiber carton	6 cans, 1 gal. each	1.2	2	53	45	50
Do	Wood box	1 can, 5 gal	1.1	7	47	38	51
Mustard-seed	Steel drum, 55-gal	None	10.7	64	424	360	56
Niger-seed	Wood barrel	do					60/62
Oiticica	do	None					55
Olive:							
Algiers	Drum		11.3		511		50
Catania	Wood box	12 tins, 1 gal. each	2.7		123		50
Genoa	Drum		10.3		476		48
Do	Wood box	12 tins, 1 gal. each	2.7		123		50
Do	do	do	2.8		119		51
Greece	Drum		11.2		511		49
Leghorn	do		10.3		481		48
Do	Wood box		2.7		119		52

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Oil—Continued.							
Olive—Continued.							
Marseille	Wood box		2.3		101		50
Do	do		2.3		101		51
Mitylene	do		2.7		104		57
Do	Drum		11.0		504		48
Piraeus	do		11.0		498		50
Sfax	do		11.0		492		50
Sicily	Cask		9.2		284		73
Tunis	Wood box		2.6		118		49
Olive, edible	Steel drum	None	11.0	49	493	444	50
Do	Wood box	2 cans, 6 gal. each	2.4	15	115	92	48
Do	do	6 cans, 1 gal. each	1.4	9	62	46	50
Olive, inedible	Steel drum	None	12.0	50	450	400	59
Orange	do	do	10.3	55	455	400	51
Do	Wood box	2 cans, 25 lbs. each	1.4	14	68	50	47
Orange (Messina)	½ case		2.6		73		80
Palm	Wood cask	do					62
Palm (West Africa)	Drum	do					70
Do	Wood cask	do					80
Palm kernel, edible	Steel drum	do	12.0	50	450	400	59
Palm kernel, inedible	do	do	12.0	50	450	400	59
Peanut	Steel drum, 55-gal	do	10.7	64	424	360	56
Perilla	Drum, 55-gal	do	10.7		424		57
Do	Steel drum, 55-gal	do	10.7	64	424	360	56
Petitgrain	Wood box		2.7		82		75
Pimento leaf (Jamaica)	Drum	None	10.5		450		52
Do	do	do	10.5		550		43
Rapeseed	Steel drum, 55-gal	do	10.7	64	424	360	56
Do	Drum	do					55/60
Argentina	do	do					90
Do	Bulk						39
Safflower	Wood barrel	None					60/62
Sandalwood	Wood box						53/56
Sassafras	Drum	None	12.0		490		55
Seal	Wood cask	do					58/60
Sesame seed, inedible	Steel drum	do	11.3	50	450	400	56
Sesame seed, edible	do	do	11.9	45	440	395	61
Soybean (Dairen)	Metal drum	do			860	765	52
Do	Steel drum, 55-gal	do	10.7	64	424	360	56
Sperm	Wood barrel	do					55
Do	Drum	do					49
Crude and refined	Steel drum	do	10.1	43	403	360	56
Sunflower, edible	do	do	12.0	50	450	400	59
Teaseed	Steel drum, 55-gal	do	10.7	64	424	360	56
Thyme	Drum	do					56/58

Tung. (See Oil, Chinawood.)							
Whale	Wood barrel	do					60
Oil cake:							
Coconut	Bag	do					78/80
Cottonseed:							
Heavy black Afli	Bulk						64/68
Light black Sakellarides	do						70/76
Linseed	Bag	None	7.1		320		50
Do	do	do					48/52
Mustard seed	do	do	7.6		195		87
Niger seed	do	do					53
Do	do	do					50/54
Soybean, round (Dairen)	Loose	do					48
Soybean, square (Dairen)	Bag	do					40
Oil cloth. (See Cloth.)							
Oil stone powder (Marseille)	Wood box		4.1		299		31
Oiticica oil. (See Oil).							
Okra (Cuba)	Wood crate	None	4.9		35		311
Okume wood							100
Oleo, stearin. (See Stearin, oleo.)							
Olives:							
Beirut	Barrel		13.9		562		56
Oran	do		14.1		594		52
Piraeus	do		4.0		145		62
Do	do		9.0		390		54
Do	do		3.8		132		65
Do	do		10.7		459		53
Do	Crate	2 cans	5.3		133		83
Green, in brine	Hogshead	None	43.4	210	1,700	1,490	57
Do	Wood barrel	do	12.9	70	500	430	57
Onions (Alexandria)	Bag		3.3		110		67
Onions:							
Wild	Crate		2.1		66		71
Wild (Casablanca)	do		3.8		125		69
Opium (Istanbul)	Wood box		3.9		197		45
Opium, gum. (See Gum.)							
Optical instruments (France)	do		5.6		96		130
Orange:							
Essence. (See Essence.)							
Oil. (See Oil.)							
Peel in brine (Messina)	Half pipe		21.3		1,100		43
Pulp (Marseille)	Wood box		4.6		105		98
Ores and concentrates (see also under specific name, also Minerals):							
Aluminum. (See Bauxite.)							
Antimony:							
Africa	Bulk						30
Australia	Bag	None			132		20
Bauxite (aluminum ore)	Bulk						28/35
Do	Bag	None			224		38
Beryl (Argentina)	do	do					20
Chrome (South and East Africa)	Bulk						15/17

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Ores and concentrates (see also under specific name, also Minerals)—Continued.							
Cinnabar							24
Do	Bag	None					18/24
Concentrates, n. o. s	do	do					15/23
Copper	Bulk						15/20
Copper concentrates (South and East Africa)	Bag	None					23
Galena (lead ore):							
China	do	do					16
Spain	Bulk						13/14
Galliver (Africa)	do						12/30
Gold slag (Africa)	Bag	None					12/15
Hematite (iron ore)	Bulk						12/15
Spain	Bag	None					20/25
Ilmenite	do	do					16
Manganese:							
Bombay	do	do					17
Brazil							18
Poti	Bag	None					20/22
Vizagapatam							19/21
West Africa	Bulk						20
Pyrites	Paper bag	None	.7	1	101	100	14
Do	Bulk						30/35
Rutile	Bag	None					32
Sheelite:							
Argentina	do	do					20
New Zealand	do	do					20
South Africa	do	do					26
Tin:							
East Africa	do	do			58		18/22
Nigeria	do	do					20
Tungsten. (See Wolfram.)							
Tungsten concentrates	Cloth bag, double	None	.6	2	102	100	14
China	Bamboo wrapping	Cloth bag	.7	1	112	110	14
Uranium	Bag	None					17/19
West Africa	do	do					20
Vanadium (South Africa)	Bag	do					23
Vanadium concentrates	Drum	do	10.6		252		92
Wolfram (Tungsten ore)	do	do					11/12
West Africa	do	do					20
Argentina	do	do					18
Zinc							20/24
West Africa							20
Zircon sand (Australia)	Bag	None	1.0		112		20
Zirconium (Brazil)	do	do					20

Organdies and other sheer cotton fabric	Wood box	do	25.0	85	300	215	187
Do	do	Paper wrapping, 1,251 yds	8.5	47	150	96	124
Origan (Piraeus)	Bag		5.8		53		246
Ossein	Cloth bag	None	2.9	2	112	110	57
Overcoats, wool, men's	Wood box, paper lined	do	30.7	105	410	305	172
Paint, dry earth. (See Mineral earth pigments.)							
Pajamas, cotton (Japan)	Wood box	do	19.2	95	287	192	149
Do	do	40 boxes	17.2	40	282	222	140
Palm fiber (Casablanca)	Bale		6.9		180		86
Paper. (See also under specific article):							
Carbon tissue (Genoa)	Wood box		8.6		249		77
Cigarette	Plywood box	2 units, 40 bobbins each	9.2	37	245	201	83
Marseille	Wood box		19.9		467		93
Do	do		18.2		464		87
Drawing (France)	do		14.5		382		85
Do	do		18.2		448		90
Rice (Japan)	do						80
Writing (France)	do		5.6		169		130
Do	do		4.8		136		80
Paperstock (England)	Bales		18.4		411		100
Do	do		13.7		310		99
Do	do		36.4		630		129
Do	do		12.1		271		99
Paprika	Bag	None	4.4		112		88
Lisbon	do	do	3.1		112		62
Piraeus	do	do	3.2		112		63
Passover bread (Haifa). (See Bread.)							
Paste, goose liver (France)	do		.5		19		58
Do	do		.6		33		39
Do	do		1.9		51		84
Do	do		1.3		31		90
Patchouli	Bale	None	20.0		400		112
Peanuts. (See Nuts, groundnuts.)							
Pears, fresh	Wood box	do	1.4	7	53	46	57
Argentina	do		1.5		50		68
Peas (Calcutta)	Bag	None					50
Peas:							
Chick (Garbanzos) (Mexico)	do	do	6.2		210		66
Dried (Australia)	do	do	3.9		177		50
Raw (Beirut)	do	do	6.2		313		43
Pectin, liquid	Wood box	2 cans, 5 gal. each	1.9	8	100	86	43
Do	Fiber carton	24 bottles, 8 oz. each	.8	2	30	13	59
Pelts. (See Fur skins.)							
Pencils (France)	Wood box		10.7		247		97
Pepper, black:							
Lampong	Bag	None	6.1		136		100
Marseille	do	do	4.9		117		93
Pepper, black, whole	Cloth bag	do	7.5	3	138	125	118
Peppers:							
In brine (Patras)	Barrel		3.7		110		76
In cans (Leghorn)	Wood box		3.2		136		52
In cans (Piraeus)	do		1.9		91		48
Roasted (Leghorn)	do		1.5		57		60

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Perfume (Marseille)	Wood box		7.8		207		85
Perfumery (France)	do		16.1		430		82
Do	do		17.5		386		100
Do	do		10.5		261		89
Do	do		33.5		660		112
Do	do		6.3		149		91
Do	do		8.0		113		156
Do	do		10.7		141		168
Do	do		28.3		344		183
Do	do		7.2		119		135
Perillo gum. (See Gum.)							
Pharmaceutical products (France)	do		5.7		148		86
Do	do		13.7		252		121
Phormium. (See Hemp, New Zealand.)							
Phosphates (North Africa)	Bulk						23/27
Phosphates (Egypt)	Bag	None					45/46
Phthalic anhydride	Wood barrel, paper liner	do	9.0	25	300	275	67
Piassava (West Africa)	Bundle	do					150
Piassava:							
Cut (Bahia)	Bale	do					100
Uncut (Bahia)	do	do					110
Pickles (Piraeus)	Barrel		3.8		190		46
Pickles (Leghorn)	Wood box		2.7		119		52
Pictures (France)	do		40.3		213		423
Do	do		18.9		449		94
Do	do		4.6		60		170
Pillowcases, cotton	do	60 boxes	25.1	50	379	205	149
Pillowcases, linen	do	25 cartons, 300 pairs	7.2	65	265	175	61
Pimento	Bag	None	9.8		150		146
Do	do	do	7.3		146		113
Jamaica	do	do	8.1		153		120
Pineapples, fresh	Wood box	do	2.9	12	80	68	80
Do	do	do	2.5		80		70
Do	Wood crate	do	2.5		82		68
Ping-pong balls (France)	Wood box		22.7		127		388
Do	do		31.8		198		360
Do	do		21.1		140		337
Do	do		41.3		257		358
Do	do		21.2		84		564
Pit props. (See "Pit props" in chapter X.)							
Pitch (Australia)	Drum	None	11.0		475		52
Plantains	Bunch		1.3		25		130
Plates, enamelware	Wood box	Packing material	5.8	33	265	220	50
Plumbago. (See Minerals, Graphite.)							

Plums (Argentina)	do		.8		20		90
Pollards	Bag	None	6.5		203		70
Pollards (River Plate)	do	do					110
Poonac. (See Oil cake, Coconut.)							
Poppy seed. (See Seeds.)							
Porcelain (France)	Wood box	do	9.3		114		183
Potato starch	Cloth bag	do	6.1	4	224	220	61
Potassium:							
Carbonate	Wood cask, paper liner	do	25.5	60	860	800	66
Do	Wood box		5.9		252		53
Chlorate	Wood barrel, cloth liner	None	5.6	23	247	224	51
Do	Wood cask, cloth liner	do	3.1	15	127	112	55
Do	Steel drum, cloth liner	do	2.3	9	121	112	43
Chloride, crude (fertilizer)	Cloth bag	do	4.2	2	202	200	46
Cyanide	Wood box, tin liner	do	4.9	33	198	165	56
Ferricyanide	Wood barrel	do	9.0	20	240	220	84
Do	Wood cask	do	3.1	15	125	110	56
Hydroxide	Steel drum	do	3.9	10	120	110	72
Nitrate, refined	Cloth bag	do	3.1	2	222	220	32
Perchlorate	Wood barrel, ICC-118 SPC	do	4.5	23	247	224	41
Permanganate	Steel drum	do	10.7	30	630	600	38
Do	do	do	2.0	7	117	110	39
Pottery (Marseille)	Wood box		74.9		1,078		157
Poultry feed (River Plate)	Bag	None			98		39
Powdered milk. (See Milk, powdered.)							
Powdered talc. (See Talc, powdered.)							
Prunes, sour (Palestine)	Wood box		2.7		116		52
Psyllium seed. (See Seeds.)							
Pumice, powdered (Lipari)	Bag		3.9		110		78
Pumice stone	do	None					110/120
Do	Wood barrel	do					175
Putchok	Bale	do					120/150
Pyrethrum (Japan)	do	do	18.0	10	410	400	97
Pyrethrum (Yugoslavia)	do	do	60.0	8	408	400	320
Pyrethrum, flowers (Kenya)	do	do	12.7		475		60
Do	do	do	13.0		213		140
Pyridine	Wood box	15 tin bottles	3.5	40	103	56	76
Quebracho:							
Extract (Argentina)	Bag	None			100		42
Logs, good cut	Loose						50/60
Logs, bad cut	do						70/85
Quince seed. (See Seeds.)							
Quinine	Wood box	Tin	4.0		54		166
Do	do	do	3.7		52		161
Quinine bark. (See Cinchona bark.)							
Quinine sulfate	Wood box	10 cans, 100 oz. each	6.0	32	117	63	112
Rabbits (Australia)	do		2.2		72		68/72
Rabbits (New Zealand)	Wood crate		2.6		80		72/74
Rabbits, canned							60
Rabbit skins. (See Skins.)							
Raffia (West Africa)	Bale	None					185
Raffia, grass	Pressed bale	do					160/180
Do	Bale	do					120/130

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Raffia, grass—Continued	Bale	None	12.1		224		121
Rags (Tunis)	do		30.7		572		120
Rags, cotton (Alexandria)	do		25.9		481		121
Do	do		34.0		787		95
Do	do		38.9		853		101
Do	do		41.8		939		100
Do	do		33.3		529		140
Do	do		27.8		474		131
Raisins, Sultanas (Izmir)	Wood box		.6		32		41
Raisins, Turkish	Wood box, paper liner	None	.6	4	32	28	41
Ramie	Ordinary bale	do					80/85
Do	Hard pressed bale	do					50/55
Sliver	Wood box	do	26.3	78	500	422	118
Do	Bale	do	6.7	20	220	200	68
Rapeseed. (See seeds.)							
Rattans	Bundle						120/150
Rattan, split	Bale	None					140/160
Rattan core	do	do					140/150
Rayon:							
Bands, visca	Wood box	None	7.4	90	310	220	55
Cloth (Marseille)	do		22.7		472		106
Filaments, singles	do	None	10.5	46	266	220	90
Staple fiber	Slat bale	do	13.3	26	526	500	57
Do	Cloth bale	do	10.7	23	523	500	42
Do	Bale	do	25.1	9	479	470	118
Do	Cloth bale	do	13.3	25	425	400	70
Tissue. (See Tissue.)							
Waste	Slat bale	do	13.3	26	526	500	57
Do	Cloth bale	do	13.3	25	425	400	70
Genoa	Bale		34.4		452		170
Yarn. (See Yarn, rayon.)							
Reeds	do	None	9.3		106		197
Do	do	do	8.0		110		163
Rennett	do		1.7		185		20
Resins, natural							
Accroides	Cloth bag	None	4.5	2	150	148	67
Batavia damar	Wood box	do	4.3	29	165	136	58
Batu and black East India	Cloth bag	do	6.7	5	165	160	91
Congo	do	do	3.2	2	113	111	63
Kauri	Wood box	do	8.9	50	300	250	67
Do	Cloth bag	do	5.3	5	215	210	55
Manila, Boea, and Loba	Fiber carton	do	7.8	12	185	173	95
Do	Cloth bag	do	8.7	5	165	160	118
Sandarac	Wood cask	do	16.9	66	346	280	109

Resin, synthetic:							
Gum ester	Bag	do	3.8		112		75
Rhea fiber. (See Ramie and China grass.)							
Ribbon, typewriter (not inked)	Wood box	Wood rolls	17.9	79	486	399	83
Ribbon (Italy)	do		27.2		287		212
Do	do		24.7		519		107
Ribbon, velvet	Fiber carton	None	.4	1	5	4	187
France	Wood box		31.2		406		172
Do	do		19.8		141		315
Do	do		38.2		336		254
Do	do		18.6		388		107
Do	do		33.0		375		197
Ribbon, velvet (silk or mixed rayon and silk)	do	Carton	6.7	33	73	22	204
Rice:							
Brazil	Bag	None					55
Genoa	Wood box		1.3		59		51
Do	Bag		3.9		110		78
Rice (specified):							
Clean:							
Saigon	do	None			120		51
Burma	do	do	3.5		170		47/48
Calcutta	do	do	5.0		224		45/50
Coolie (Calcutta)	do	do					47/52
Dust or boussir	do	do					60/65
Half husked (Calcutta)	do	do					58
Meal	do	do					60/63
Paddy	do	do					68
Rough (Burma)	do	do					51/52
Unpolished (China)	Pocket	do	2.3		99		51
Whole, cleaned	Fiber carton, cloth bag	do	.6	3	224	221	61
Do	Cloth bag	do	2.3	1	101.	100	51
Rice paper. (See Paper.)							
Robes, bath, cotton terry (Czechoslovakia)	Wood box	Paper wrapped	54.4	177	445	259	280
Rochelle salts	Wood barrel, paper liner	None	6.6	26	250	224	59
Do	do	do	3.4	13	125	112	60
Rock wool, metal reinforced	Wood crate	Corrugated fiber board	20.0	67	400	333	112
Rock wool, plain	Paper bag	None	3.8	1	36	35	236
Roots:							
Althea (Leghorn)	Bag	do	6.4		137		103
Arrowroot. (See Arrowroot.)							
Burdock	do	do	6.3		104		135
Canaigre	do	do	6.4		103		140
Do	do	do	7.1		101		157
China	do	do					95/100
Fustic:							
Split (Jamaica)							130/140
Straight (Jamaica)							90
Unsplit (Jamaica)							150/160
Gentian	Bale	None					130
Gentian, dry (Marseilles)	do	do	10.8		240		101
Ginger	do	do					115/135
Do	Bag	do	5.5		120		103

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Roots—Continued.							
Ginseng	Wood barrel	None	12.4		241		115
Do	Wood cask	do	12.3		191		145
Ipecac	Bag	do	2.0		167		27
Colombia	do	do	8.4		167		113
Licorice	Bale	None	8.3	4	374	370	50
Do	do	do	10.7		375		63
Do	do	do	36.0	4	204	200	393
Licorice (Alexandretta)	Covered bale		13.0		332		87
Madder. (See Madder.)							
Orris	Bag	do	6.7		176		84
Rhubarb							105
Sarsaparilla	Bale	None	16.0		198		180
Sassafras	do	do	26.3		500		117
Seneca	Bag	do	7.3		140		125/135
Rope, Manila (Philippine)	Coil				50		75
Roses, dry (Marseille)	Wood box		5.4		67		181
Rose flowers (Marseille)	Bale		8.4		77		244
Rubber:							
Crude:							
Brazil	Wood box		12.3		419		65
Java	do		5.3		202		58
Singapore	Plywood box	None	5.0		224		50
Do	Burlap and rubber bale	do	5.0		170		66
Do	do	do	5.0		224		50
Do	do	do	5.0		270		42
West Africa	Bale	do					65
Crude, large lumps (Brazil)	Wood box		6.3		170		82
Guayule	Bag	None	4.6		158		64
Jelutong. (See Jelutong.)							
Latex	Drum	do	11.0		517		48
Do	do	do	12.6		222		124
Latex (West Africa)	do	do					65
Pale crepe (Singapore)	Bale	do	5.0		180		62
Raw (Para)	Wood box						70
Do	Balls						60
Smoked sheets (Singapore)	Bale	None	5.0		235		48
Washed (Para)	do	do			440		80
Do	Wood box						80
Rugs:							
Cotton	Cloth bale	None	19.3	8	330	322	132
"Basket weave, 17" x 54"	do	do	7.0	3	140	137	112
Basket weave, 24" x 48"	do	do	5.6	2	113	111	112
Chenille, 36" x 60"	do	do	7.0	4	144	140	107
Hit-and-miss	Straw matting bale	do	6.7	3	130	127	118

Hit-and-miss, 27" x 54"	Cloth bale	do	9.1	4	182	178	112
Oriental, imitation	do	do	12.0	8	220	212	124
Oriental	Bale	do					99
Do	Cloth bale	do	17.9	4	261	257	149
Rag, 27" x 54"	do	do	9.0	4	200	196	102
Rice straw (Japan)	Matting roll	do	11.0	12	130	118	187
Rum	Wood box	12 bottles, ½ gal	1.3	11	47	19	64
Do	do	do	1.3	9	46	20	66
Do	Fiber carton	do	1.2	3	40	20	68
Ruscus (Leghorn)	Bale		14.6		123		265
Rutile ore. (See Ores and concentrates.)							
Rye:							
Light (Black Sea)	Bulk						56
Heavy (Black Sea)	do						48
Rye (Trieste)	do						54
Safflower	Bale	None					65/70
Do	Wood box						58/60
Saffron							70/73
Sago	Bag	None	2.7		112		55
Do	Cloth bag	do	4.1	2	142	140	66
Do	Wood box						54/55
Sago flour	Bag	None					50/54
Saigon cassia, whole. (See Cassia, whole (Saigon).)							
Salami (Naples)	Wood box		1.7		37		106
Do	do		3.5		99		79
Salmon, pickled or salted	Wood tierce	Brine and salt	23.0	122	1,100	825	47
Do	do	do	11.8	48	550	400	48
Do	do	do	7.1	32	330	200	48
Do	do	do	3.7	20	170	100	48
Salts, Rochelle. (See Rochelle salts.)							
Salt	Bulk						35/40
Saltpeter (Calcutta). (See Minerals.)							
Samp	Bag	None					50/54
Sandalwood (Sapan wood)	Bale	do					110/115
Do	Bulk						100/110
Sandalwood, powder	Wood box						90
Sardines	do	100 cans, No. 1 oval	.7	8	40	17	37
Do	do	do	.5	4	24	10	45
Spain	do		.9		46		44
Casablanca	do	100 cans	.9		35		58
Do	do	50 cans	.7		20		75
Seagrass (Tunis)	Bale		16.2		95		381
Seaweed	Bag	None	7.0		107		146
Seeds:							
Alfalfa	do	do	5.7	3	220	217	57
Anise	do	do	5.0		70		120
Anise, star (Indochina)	do	do	4.3		64		149
Annatto	do	do	6.3		516		28
Beni	do	do					52/57
Bird	do	do					60
From Turkey	Cloth bag	do	7.0	4	220	216	71
From River Plate	Bag	do					60

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Seeds—Continued.							
Canary	Bag	None	6.0		226		60
Caraway	do	do					60/64
Do	do	do	5.2		110		106
Do	do	do	8.5		196		97
Cardamon	Tins		.7		34		47
From Ceylon	Wood box		6.7		117		128
From Madras	do		4.0		112		80
Without pods	do		5.0		206		55
Carthamus	Bag	None					90
Cassia	Wood box	do	3.0		84		80
Castor	Bag	do					60
Bahia	Wood box	do			132		85
Bombay	do	do					70
Brazil	Bag	do	4.4	1	131	130	75
Calcutta	Wood box	do					80
Do	do						65
East Africa	do	None	5.0		160		70/75
Saigon	do	do					75
West Africa	do	do					70
Cebadilla	do	do	3.7		100		84
Celery	do	do					76
Clover	do	do	5.8	3	223	220	57
Cocksfoot, dressed	do	do					150
Cocksfoot, undressed	do	do					196
Coriander:							
Argentina	do	do					70
Casablanca	do	do	6.7		110		136
Do	do	do	6.8		100		148
Cotton:							
Bombay	Bag	do			140		68/70
Calcutta	Bulk						72/80
East Africa	Bag	None	5.5		150		80
South Africa	do	do					70
Croton	do	do	4.1		113		81
Cumin:							
Larnaca	do	do	5.6		110		113
Do	do	do	5.5		95		129
Do	do	do	5.0		102		110
Marseille	do	do	6.6		130		112
Do	do	do	6.0		110		120
Dari	do	do					50
Fennel	do	do					95/96
Fescue	do	do	6.6	3	115	112	132
Flaxseed. (See Seeds, linseed.)							
Gingelly (Africa)	Bag	None					65/67

Hemp	Bulk						70
Dairen	Bag	None			155		75
Do	Bulk						58
Linseed	do	do					54
Do	do	do	5.0	2	142	140	80
Do	do						50
Calcutta	Bag	None					57
River Plate	do	do					60
Do	Bulk						50/55
Millet	do	None					45/51
Do	do	do	2.8		112		60
Durra (Turkish millet)	do	do					48/50
Kaoliang (Dairen)	do	do			188		55
Mowrah	do	do					62/65
Mustard	do	do					65/80
Do	do	do	5.7		220		58
Do	do	do	2.6		110		53
Constanza	do	do	6.6		220		67
Niger	do	do					63
Poppy	do	do	4.1		110		84
Calcutta	do	do					70
Psyllium (Marseille)	do	do	6.9		220		69
Do	do	do	4.6		198		50
Quince (Haifa)	do	do	8.0		172		104
Rape	do	do					58/62
Calcutta	do	do					60
Semolina	Bag	do	4.5		140		72
Do	do	do	2.9		99		66
Sesame:							
Alexandria	Bulk	do	6.0		198		68
India	do	do					60/68
West Africa	do	do					65
Spinach	do	do	3.5	1	101	100	77
Do	do	do	3.5		112		70
Sugar beet	do	do	4.3		73		131
Sunflower:							
Argentina	do	do			110		65
Odessa							82
South and East Africa	Bag	None					70
Do	do	do	6.7		133		112
Trieste							84
Surrie							90
Teazle (Marseille)	Bag	None	7.7		141		123
Teel	do	do					60/68
Timothy	do	do					60/110
Trefoil	do	do					60/65
Vanilla beans. (See Vanilla.)							
N. o. s. (Marseille)	do	do	5.2		178		65
Sewing, Chinese	Wood crate		14.0		94		334
Shark fins	Wood box		13.2		342		86
Sheelite ore. (See Ores and concentrates.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Sheets, linen	Wood box	75 cartons, 1 pair each	11.0	100	415	240	59
Sheets and pillow cases, cotton	do	Cartons	13.4	34	260	196	118
Do	do	do	14.1	43	322	249	97
Shellac (Calcutta)	do						60/70
Do	do				224		86
Do	Bag	None	6.0		160		85/90
Do	do	do	4.2		168		56
Shells, sea (Genoa) (see also under specific name)	Barrel	do	11.3		101		246
Shoes, leather, women's	Wood box	60 boxes, 1 pair each	10.8	44	125	60	193
Shrimp:							
Dry	Bag	None	10.3		268		86
Fertilizer	do	do	11.0		230		106
Shells	do	do	14.5		278		116
Sienna earth. (See Mineral earth pigments.)							
Silicon carbide (Marseille)	Cask		3.7		224		37
Silk:							
Artificial. (See Rayon.)							
Cocoons	Hand-packed bale	None					210/220
Do	High-density, pressed bale	do					60/80
Raw	Cloth bale	do	7.1	12	145	133	112
Canton	Bale	do	5.0		115		97
China	do	do	5.7		145		82
Do	do	do	4.9		114		97
Japan	do	do	6.5		145		102
Do	do	do	7.7		140		126
Do	do	do	7.0		140		112
Do	do	do	6.3		143		99
Waste	do	do					110/125
Do	Pressed bale	do					55/65
Naples	Bale		34.4		452		172
Silverware (Italy)	Wood box		7.4		120		138
Do	do		25.7		306		188
Simsim (East Africa)	Bag	None	5.5		180		65/70
Sinews (River Plate)	Bale	do			125		80
Sisal:							
East Africa	Large bale	do	18.0		448/560		80/85
Do	Small bale	do	8.0		224		80/85
British	Bale	do	30.5	8	513	505	132
Java	do	do	15.5		447		78
Do	do	do					110
Do	do	do	16.9	5	569	564	68
Lobito	do	do					75
Mexico	do	do					180
Do	do	do	22.4	4	412	408	120
South Africa	do	do					80/85
Sisal grass (not burlapped)	do	do	21.0		230		204

Skins (see also Fur skins):							
Alligator, green, salted	Wood cask	do	30.0		1,060		63
Calf:							
Dry (Australia)	Bundle	do	25.0				265
Wet (Australia)	Wood cask	do	33.7				1,200
Chamois (France)	Bale		7.3		850		19
Deer:							
England	Bundle		4.5		42		240
Hong Kong	Bale	None	23.2		900		58
Dog	do	do					90/115
Fox:							
Canada	Wood box	do	26.9	18	182	164	330
Do	Bale	do	40.0		289	278	311
United Kingdom	Wood box	do	29.1	22	188	166	350
Do	Bale	do	15.8	8	270	262	131
Union of Soviet Socialist Republics	Wood box	do	4.9	14	84	70	130
Do	do	do	28.0	22	347	325	181
Goat (see also Skins, lamb, kid, sheep, and goat):							
Algiers	Bale		9.3		220		95
Marseille	do		14.3		282		107
France	Wood box		9.5		294		72
Do	Bale		8.9		292		68
South Africa	do	None					80
Kangaroo (Australia)	do	do	31.0		500		139
Kidskins	Bundle	do	1.6		21		171
Do	do	do	2.3		39		132
(See Skins, lamb, kid, and goat.)							
Lamb, pickled (Marseille)	Barrel		6.9		264		58
Lamb, kid, sheep, and goat (China)	Wood box	None	18.0	77	369	292	110
Do	do	do	20.0	79	374	295	120
Mink (Japan)	do	do	10.9	60	230	170	106
Do	do	do	14.5	75	235	160	138
Pig, tanned (Brazil)	Wood box						80
Rabbit:							
Australia	Bale	None	20.4	17	518	501	88
Do	do	do	20.4	19	514	495	88
Do	do	do	26.3		500		118
Belgium	do	do	13.9	18	275	257	114
Do	do	do	13.9	16	273	257	114
Constanza	do		18.9		225		166
France	do	None	18.5	6	194	188	213
Do	do	do	9.4	3	67	64	315
New Zealand	do	do	20.4	19	518	499	88
Do	do	do	20.4	18	516	498	88
Do	do	do	5.2		80		145
United Kingdom	do	do	7.5	6	178	172	94
Do	do	do	13.3	10	184	174	162
Rabbit (specified):							
Dressed (England)	do		27.7		597		103
Do	do		10.4		181		129
Raw (England)	do		10.9		244		100
N. o. s. (Port Elizabeth)	do	None	25.0		450		125

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Skins (see also fur skins)—Continued.							
Sheep (see also Skins, Lamb, kid, sheep, and goat):							
Australia	Bale	None	22.7		750		68
South Africa	do	do					100
Argentina	do	do	34.5		1,012		76
Do	do	do	33.6		972		77
Sheep (specified):							
Pickled	Wood cask	do	30.0		1,120		84
Raw (Argentina)	Bale	do			946		45
Raw (Bahia)	do	do					132
Skivers (France)	Wood box		18.8		372		113
Do	do		16.2		416		87
N. o. s. (West Africa)	do	None					150
Skins, prepared (France)	do		17.8		299		133
Do	do		13.1		240		122
Do	Bale		25.3		363		156
Snails (Casablanca)	Wood crate		1.8		64		64
Snail shell, green (Australia)	Bag	None	6.3		130		110
Soap:							
Leghorn	Wood box		.9		33		62
Marseille	do		2.1		64		73
Piraeus	do		1.3		59		48
Do	do		3.2		154		46
Soap stock (River Plate)	Wood barrel	None					60
Sodium:							
Acetate	Steel drum	do	10.5	30	380	350	62
Chlorate	Steel drum, ICC-6F	do	1.7	6	106	100	35
Cyanide	Steel drum	do	3.8	16	240	224	36
Do	do	do	2.0	12	124	112	37
Ferrocyanide	Wood box	do	2.7	10	120	110	50
Nitrate	Bag	do	2.7		200		31
Perborate	Steel drum	do	7.6	26	250	224	68
Phosphate	Wood barrel, paper liner	do	10.9	23	349	325	70
Do	do	do	6.6	26	246	220	60
Do	Wood cask, paper liner	do	4.5	14	139	125	72
Do	do	do	3.4	13	123	110	60
Pyrophosphate	do	do	9.8	23	373	350	59
Do	do	do	4.9	14	126	112	86
Silicofluoride	Cloth bag	do	2.8	2	222	220	28
Sulfate, anhydrous	Wood cask	do	5.4	37	478	441	25
Do	Cloth bag	do	3.9	2	222	220	39
Soybean	Bulk						44/46
Dairen	Bag	None	4.4		187		53
Spermacetti wax. (See Wax.)							
Spices, n. o. s. (see also under specific name)	Bale	do	5.1		101		112
Spinach seed. (See Seeds.)							

Sponges	Pressed bale	do					150/180
Do	Bale	do	8.5		138		130
Sprats, in jelly (Haifa)	Wood box		1.7		77		48
Sprats, in tomato sauce (Haifa)	do		1.7		73		51
Starch. (See under specific name).							
Statuary (Italy)	do		9.9		325		68
Statues, marble, ecclesiastical	Wood wedges	None	24.0	100	1,000	900	54
Stearin (Australia)	Drum	do	12.0		450		60
Do (River Plate)	Wood cask	do					70
Stearin, oleo	Wood barrel	do	10.0	25	375	350	59
Steel strip, razor	Wood box	do	4.3	70	500	430	19
Straw braid (see also under specific article)	do		18.0		804		51
Far East	Bale	None					180/240
Do	Wood box						160/200
Italy	do		13.1		129		227
Do	do		23.3		238		219
Orient	Bale	None	10.5		137		171
Do	do	do	9.0		101		200
Straw hats (Italy)	do		18.7		86		488
Do	do		24.8		118		471
Straw goods (Leghorn)	do		23.6		238		219
Do	do		8.6		179		107
Do	do		19.3		123		347
Strontium nitrate	Wood barrel, paper liner	None	7.2	24	724	700	22
Sugar:							
Alexandria	Bag	do					46/49
Australia	do	do					44/46
Brazil	do	do					48
Calcutta	do	do					44
Cuba	do	do					42/47
Maracaibo	do	do	4.7		240		44
D	do	do	4.4		220		45
Mauritius	do	do					38/43
Port Cabello	do	do	4.0		202		44
Sugar (specified):							
Brown (South and East Africa)	do	do					40
Muscavado	do	do	3.7		154		53
Raw:							
Australia	do	do	4.0		160		56
Java	do	do					42/44
Philippines	do	do	2.9		140		46
Refined (Java)	do	do					48/52
White (East Africa)	do	do	5.5		224		45/50
White (South Africa)	do	do					45
Yellow (South Africa)	do	do					42
Sugar beet, raw	do	do					60/65
Sugar beet, seeds. (See Seeds.)							
Sugarcane (Australia)	do	do					50/52
Sulfur, rough	Bulk						30/35
Do	Bag	None					35/38
Do	Keg	do					60
Sultanas. (See Raisins.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Sumac	Bag	None	4.0		170		55
Do	do	do	5.0		162		69
Sumac, ground (Palermo)	do	do	5.0		159		70
Sunflower seeds. (See Seeds.)							
Surrie seeds. (See Seeds.)							
Tablecloths, cotton damask	Cloth bale	Paper wrapping	9.7	19	248	229	88
Do	Wood box	do	18.3	81	600	510	68
Do	do	None	15.2	83	538	455	90
Do	do	Paper wrapping	12.8	67	400	333	72
Do	do	do	9.2	57	322	260	64
Talc, powdered (Genoa-Leghorn)	Bag	None	3.0		220		30
Do	Barrel		3.0		123		54
Tallow	Steel drum	None	12.0	50	450	400	59
Australia	Wood cask	do					70/80
Do	Drum	do	11.7		450		58
New Zealand	Wood cask	do	19.7		876		51
Do	do	do	32.0		896		80
River Plate	Wood tierce	do					75/80
Tankage (Australia)	Bag	do	5.3		100		119
Do	do	do					60/65
Tapioca, flake	do	do					66/68
Tapioca, flour	do	do					52/54
Brazil	do	do	6.0		219		61
Tapioca, processed	Wood box	4 pkgs., 5 lb. each	.6	2	22	20	61
Do	do	24 pkgs., 8 ozs. each	.4	2	14	12	68
Do	Bag	do	5.8		192		68
Do	do	do	5.6		170		74
Tares	do	do					50/52
Do	Bulk						48
Tartar:							
Algiers	Bag	None	5.5		240		51
Do	do	do	6.5		251		58
Oran	do	do	6.7		267		55
Do	do	do	6.5		251		58
Tea:							
Africa	Chest						90/95
Calcutta	do						60
Ceylon	do						100
Do	Wood box		5.0		117		96/103
China	Wood box, mat covered	Packages	2.1	16	46	30	102
Do	Chest						100
Do	Half chest		3.2		65		110
Do	Wood box		3.3		82		91
East Africa	Chest						85/91

Formosa	Wood box, mat covered	Packages	3.0	19	61	42	107
Hong Kong	Half chest		2.7		55		110
India	Venesta case	Packages	2.7	10	70	60	86
Japan	Wood box		3.9		96		91
Do	Wood box, mat covered	Packages	4.0	18	88	70	102
Java	Wood box						88
South Africa	Large case		6.0		140		96
Do	Small case		4.0		119		79
Sumatra	Chest		5.0		86		130
Tea, English breakfast	Wood box, mat covered	Packages	3.7	22	92	70	90
Tea dust	Wood box		2.0		49		90
Teakwood (Africa)							40/45
Teakwood (India)							40
Teak, logs (Burma)							80
Teak, boards (Burma)							75/80
Teazle seed. (See Seeds.)							
Teel seed. (See Seeds.)							
Thistles (Marseille)	Wood box		112.7		570		451
Thread:							
Angora (France)	do		23.8		161		331
Do	do		42.4		292		325
Do	do		43.7		286		342
Do	do		41.0		230		399
Cotton (France)	do		16.0		219		163
Do	do		19.2		229		187
Do	do		7.5		193		87
Do	do		14.9		441		76
Linen	do	Carton, 6 cones each	13.9	103	445	336	70
Do	Plywood carton	Paper	14.4	40	316	275	102
Thyme (Marseille)	Bale		13.0		174		169
Do	do		7.7		110		155
Do	do	None					125/130
Tile:							
Floor	Wood crate	Corrugated cardboard	1.3	8	101	93	29
Flat wall	do	do	1.3	8	87	79	33
Do	do	do	1.3	8	85	77	34
Trim wall	do	do	1.3	8	65	57	45
Do	do	do	1.3	8	60	52	48
Timothy seed. (See Seeds.)							
Tin:							
Ore (Cassiterite). (See Ores and concentrates.)							
Refined:							
Foil (China)	Bundle	None					22/25
Do	Wood box						30/32
Ingots (Nigeria)	Each						10
Pig (Netherlands Indies)	do		.3		78		7
Do	do		.3		100		7
Do	do		.2		54		42
Tincal							42

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Tissue:							
Cotton:							
France	Wood box		18.3		350		114
Do	do		31.7		573		123
Do	do		20.3		460		98
Do	do		14.2		185		172
Do	do		38.2		623		136
Do	do		35.3		496		159
Do	do		41.5		373		188
Do	Bale		11.3		152		83
Genoa	Wood box		20.7		450		148
Italy	do		13.1		231		127
Do	do		15.5		312		112
Do	do		13.8		312		99
Do	do		16.4		233		158
Do	do		21.2		278		170
Cotton and rayon (Genoa)	Bale		27.5		392		156
Do	Wood box		27.6		291		212
Do	do		14.9		227		146
Rayon:							
Genoa	Bale		23.5		405		129
Italy	Wood box		34.3		662		116
Do	do		12.2		263		104
Do	do		28.7		431		149
Do	do		24.5		384		143
Do	do		18.0		302		134
Do	Bale		11.4		226		113
Woolen (Italy)	Wood box		19.9		304		122
Tobacco, unspecified	Wood crate	Bass, paper	9.4	30	195	160	107
Beirut	Bale (semi-pressed)		18.6		246		167
Calcutta	Bale						70
Cavalla	do		4.2		75		123
East Africa	do	None					100/130
Do	Wood box						200
Do	Wood cask	None					180
England	Wood box		12.4		508		55
Do	do		21.4		376		127
Do	do		14.8		328		101
Do	do		12.7		263		109
Istanbul, Izmir	Bale		5.3		132		90
Istanbul-Kassia	do		8.1		90		202
Izmir	do		5.0		191		95
Mitylene	do		5.2		114		101
Do	do		4.7		116		92
Netherlands Indies	do	None	8.0		178		100
Do	do	do	10.7		172		139

Patras-Alexandropoulos	do		3.4		75		102
Samsun	do		6.4		90		160
South Africa	Small bale	None	7.5		220		75
Do	Medium bale	do	9.7		224		98
Do	Large bale	do	15.1		330		102
Do	Small case		15.0		462		73
Do	Large case		20.0		530		84
Do	Small cask	None	70.0		924		168
Do	Large cask	do	77.0		965		182
Thessaloniki	Bale		.9		22		93
Do	do		1.5		30		110
Do	do		2.6		36		160
Do	do		1.3		33		90
Do	do		3.8		82		105
Tobacco, cigar (see also Cigars):							
Filler:							
Havana	do	Heavy cardboard corners	8.8	6	126	119	160
Manila	do	Palm leaf scrap	10.7	6	266	259	90
Puerto Rico	do	Heavy cardboard corners	9.0	4	161	156	124
Unspecified	Wood barrel	None	15.6	36	150	114	224
Leaf:							
Manila	Bale	Rattan	14.8	10	400	390	83
Puerto Rico	do	Paper	8.3	4	154	150	121
Wrapper:							
Havana	do	Bass, paper	15.8	3	140	127	249
Sumatra and Java	Wood box	Bass, paper, burlap	12.8	55	234	170	124
Tobacco, cigarette (Turkish)	Bale	Cardboard	5.1	1	143	140	80
Tobacco, leaf (Turkish	do	None	5.5	1	126	125	97
Tobacco scrap (Havana)	do	do	11.2	7	142	135	187
Tomatoes:							
Naples	Wood box	24 tins	1.6		73		49
Leghorn	do	do			73		49
Do	Carton	48 tins	1.5		66		51
Naples	do	24 tins			69		49
Do	do	48 tins			68		49
Do	Wood box	96 tins	1.7		73		51
Tomato sauce:							
Naples-Genoa	do		1.7		73		54
Naples	do		1.4		66		48
Leghorn	Cartons		1.1		60		40
Do	Wood box	100 tins	1.5		64		53
Tonka-beans (Para)	Wood barrel	None					90
Do	Wood box						70
Tools, n. o. s. (Italy)	do		2.9		144		45
Toothpicks (France)	do		9.3		88		235
Tortoise shells	do						135/150
Tow (Africa)	Bale	None	15.0		220		150
Tow (New Zealand)	do	do	40.0		560		160
Towels:							
Cotton, terry (England)	Wood box	Paper wrapped	25.4	116	390	272	149
Linen, 200 dozen	do	None	13.6	120	670	559	46
Linen, buck (Ireland)	do	Paper wrapped	18.4	90	338	245	124

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Toys (France)	Wood Box		39.2		308		220
Do	do		26.9		204		295
Do	do		22.7		317		160
Tracing cloth. (See Cloth, tracing.)							
Trefoil seeds. (See Seeds.)							
Trepang. (See Beche-de-mer.)							
Trichlorethylene	Steel drum, 55-gal.	None	10.4	88	688	600	34
Tubes, paper (France)	Wood box		12.8		355		80
Tulle (France)	do		16.7		141		264
Do	do		40.7		403		226
Do	do		37.3		437		191
Do	do		46.3		533		194
Do	Bale		23.3		239		219
Tuna fish (Casablanca)	Wood box		.8		21		88
Tuna fish, canned	do	48 cans, ½ lb. each	.8	9	36	21	52
Tung oil. (See Oil, Chinawood).							
Tungsten ore (Wolfram). (See Ores and concentrates.)							
Turmeric (India)	Bag	None					65/75
Turpentine (Spain)	Wood box		1.5		83		40
Tusks, ivory	Each		1.3		62		45
Do	Loose						28
Twine, hemp. (See Hemp, twine.)							
Typewriters (Italy)	Wood box		5.7		127		101
Umber, raw powdered. (See Mineral earth pigments.)							
Upholstery cloth, cotton, jacquard figured. (See Cotton cloth.)							
Uranium. (See Ores and concentrates.)							
Urea	Cloth, paper lined	do	3.1	2	102	100	68
Valonea:							
Beards (Izmir)	Bag		8.3		181		102
Cups (Izmir)	do		7.0		173		91
Cups (Kilindria)	do		5.7		110		116
Extract (Mitylene)	do		5.7		176		73
Vanadium. (See Ores and concentrates.)							
Vanilla beans	Wood box		2.5		121		45
Do	Bag	None	2.8		125		50
Madagascar	Wood box	Tins	3.5	26	147	112	53
Marseille	do		4.6		154		66
Do	do		4.4		154		64
Do	do		4.6		165		62
Do	do		3.8		121		70
Vaseline (France)	do		13.7		50		61
Vegetable fibre (Casablanca)	Bale		7.0		132		119
Vegetables, canned (Piraeus)	Wood box		2.9		110		55
Velvet ribbons. (See Ribbons.)							

Velveteen. (See Cotton cloth.)							
Verdigris	Wood barrel	do	13.6		535		58/60
Vermicelli	Plywood box	23 boxes, 1 lb. each	1.9	9	37	25	112
Vermillion reds	Wood cask	None	2.0	15	125	110	36
Vomica nuts. (See Nux vomica.)							
Watches, nickel case	Wood box	144 cartons	2.6	7	40	30	149
Water, mineral (Leghorn). (See Mineral water.)							
Wattle bark (East Africa)	Bag	None	6.0		131		105
Pressed	Bale	do	4.0		224		40
Extract	Bag	do	3.0		112		60
Wax:							
Beeswax:							
South Africa	do	do	5.5		120		100
Do	Wood barrel	do					68/70
West Africa	Bag	do					75
Carnauba (Bahia)	do	do					90
Do	do	do					65/68
Curicury (Bahia)	do	do					90
Japan	Wood box						63
Spermacetti	do	None	4.5	24	136	112	74
Vegetable (Japan)	do		6.0		260		52
Wheat:							
Australia	Bag	None					52
Bahia Blanca	do						45/50
Calcutta	do	None					48
East Africa	do	do	5.0		203		50/53
Montreal	Bulk						45/47
New Zealand	Bag	None	5.0		203		51/53
Vancouver	Bulk						44/49
Wheat, heavy:							
Australia	do						45/49
Black Sea	do						42
Wheat, light (Black Sea)	do						45
Whisky	Wood hogshead, 63/65 wine gal.	None	18.4	130	630	500	66
Do	Wood barrel	do	13.2	100	480	380	62
Do	Wood box	12 flat bottles, ⅛ gal. each	1.2	10	50	19	53
Do	do	12 bottles, ⅛ gal. each	1.1	7	44	19	57
Do	do	24 bottles, ⅒ gal. each	1.5	13	59	19	56
Do	do	do	1.1	8	49	19	52
Do	do	48 bottles, ½ pt. each	1.8	10	66	23	62
Whisky, various brands (England)	do	12 bottles	1.0		42		53
Do	do	24 pts.	1.3		52		43
Do	do	12 bottles	1.5		46.5		72
Do	Cartons	do	1.3		42		67
Do	Wood box	do	1.2		41.5		63
Do	Cartons	do	1.2		38.25		67
Do	Wood box	24 pts.	1.1		42.5		57
Do	do	12 bottles	1.1		41.25		58
Do	do	do	1.1		42.5		57
Do	do	do	1.2		42		61
Do	do	do	1.1		42		57
Do	do	do	1.1		41.5		58

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Whisky, various brands (England)—Continued	Wood box	12 bottles	1.3		42		59
Wickerwork (France)	do		32.8		156		471
Willow canes (Argentina)	Bundle						300
Wine:							
General classification:							
Sacramental (Palestine)	Barrel		30.9		1,131		61
Do	do		14.5		571		57
Sparkling (Genoa)	Wood box		3.1		114		60
Still, imported:							
Bulk	Wood barrel, 50 gal	None	13.3	88	488	400	61
Do	do	do	13.3	72	472	400	64
Bordeaux	Wood box separators	12 bottles, 1/5 gal. each	1.4	15	52	19	62
Do	do	24 bottles, 1/10 gal. each	1.6	18	58	19	61
German	Wood box	do	1.7	21	59	19	64
Do	do	12 bottles, 1/5 gal. each	1.3	16	51	19	57
Specified:							
Champagne	Wood box separators	do	1.6	11	64	19	56
Do	do	do	1.7	18	64	19	59
Do	do	24 bottles, 1/10 gal. each	1.9	25	74	19	56
France	Wood box	Bottles	1.7		63		62
Do	do	do	1.7		70		53
Chianti	do	12 bottles, 1 qt. each	1.9	11	64	24	66
Mellini (Genoa)	do	48 bottles, 8 oz. each	1.9		60		71
Do	do	12 bottles	1.7		50		75
Do	do	24 bottles, 1 pt. each	1.7		57		70
Do	do	6 jugs, ½ gal. each	1.9		46		94
Pegaso (Leghorn)	do	12 bottles, 1 qt. each	1.9		55		78
Do	do	12 bottles, 2 qts. each	3.6		85		94
Do	do	24 bottles	1.9		59		73
Ruffino (Leghorn)	do	24 bottles, 1 pt. each	1.8		55		75
Do	do	12 bottles, 1 qt. each	1.7		50		79
Do	do	12 bottles, ½ gal	3.3		83		90
Do	do	48 bottles, ½ pt	1.8		59		70
Claret	Fiber carton	12 bottles, 1/5 gal. each	1.2	2	39	19	68
Italy	Wood barrel, 42 gal	None	14.1		445		70
Do	Wood barrel, 48 gal	do	13.0		491		59
Marsala (Italy)	Wood box	12 bottles	1.5		50		67
Mozelle	do	12 bottles, 1/5 gal. each	1.5	11	54	19	62
Port (Lisbon)	do	12 bottles	1.5		51		66
Ruby (Lisbon)	do	do	1.4		50		64
Do	do	do	1.7		54		69
Do	do	do	1.5		52		65
Tawny (Lisbon)	do	do	1.5		50		68
Retsina (Piraeus)	Crate	6 gal	3.2		79		90
Sauterne	Wood box	12 bottles, 1½ pts. each	1.6	13	51	18	68
Sherry and port	do	12 bottles, 1/5 gal. each	1.6	16	54	20	66

Vermouth:							
Argentina	do	Bottle	1.7		55		70
Do	Wood cask	None					70
Cinzano (Marseille)	Wood box	12 bottles	1.7		60		62
French	do	24 bottles, 1 pt. each	1.7	20	64	23	61
Do	do	12 bottles, 1 qt. each	1.2	16	58	23	45
Do	Fiber carton	do	1.5	3	49	23	68
Martini and Rossi (Genoa)	Wood box	12 bottles	1.5		57		59
Do	do	24 bottles	1.7		65		57
Nuge-Richards (Marseille)	do	12 bottles	1.7		57		64
Unspecified:							
France	Wood box		1.5		59		57
Do	do		1.4		60		53
Do	do		1.5		53		63
Lisbon	do		1.3		44		64
Piraeus	do		1.3		50		60
Wine lees (tartar) (Argentina) (see also Argols)	Bag	None					60
Wire rods, steel	Coils	do	2.6	1	225	224	26
Wolfram (Tungsten ore). (See Ore and concentrates.)							
Wood pulp (Scandinavia)	Bale	None	10.5		448		52
Dry	do	do	10.2		450		51
Wood pulp, sulfide, dry (Sweden)	do	do					50/55
Wood pulp, wet mechanical (Sweden)	do	do					45/53
Wood works (Leghorn)	Wood box		21.3		106		446
Wooden balls (Italy)	do		7.4		231		72
Do	do		6.1		225		60
Woodenware (France)	do		30.5		456		149
Do	do		18.6		252		165
Do	do		27.8		417		149
Wool:							
Compressed (dumped):							
Alexandretta	Bale	None	22.7		497		102
Argentina	do	do	33.6	10	966	956	78
Australia	do	do	18.8	12	275	263	153
Do	do	do	18.8	12	350	338	120
Beirut	do	do	22.0		478		103
China	do	do	12.6	24	429	405	66
Cordoba	do	do	33.8	16	962	946	79
East Africa	do	do	15.0		410		82/90
East India	do	do	11.1	15	486	471	51
Iran	do	do	16.2		320		113
Iraq	do	do	16.7	8	341	333	109
Do	do	do	15.7		350		100
Montevideo	do	do	36.0	18	1,056	1,038	76
South Africa, Cape	do	do	18.8	12	285	273	147
Do	do	do	18.8	12	300	288	140
Tibet	do	do	10.7	25	298	273	81
Compressed (dumped) blackface (Ireland)	do	do	30.8	9	428	419	161
Greasy:							
Argentina	do	do	37.5		1,000		84
Australia	do	do	16.3		320		115
Do	do	do	18.8		330		127

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Wool—Continued.							
Greasy—Continued.							
Chile	Bale	None	14.0		500		63
Do	do	do	14.0		1,000		31
China and India	do	do	14.0	8	375	367	83
Donskoi	do	do	8.0		300		60
Do	do	do	6.8		300		51
New Zealand	do	do	25.0		365		153
Do	do	do	17.0		392		95
Peru	Bag	do	14.0		230		137
Do	Bale	do	14.0		800		39
Do	do	do	14.0		1,000		31
Port Elizabeth	do	do	20.0		320		140
South Africa	do	do	27.0		370		164
Do	do	do	38.9	13	350	337	249
South America	do	do	72.0	21	1,000	976	160
Scoured:							
Argentina	do	do	37.5		700		120
Do	do	do	37.5		800		105
Australia	do	do	21.0		280		168
Do	do	do	18.8		250		168
Montevideo	do	do	38.0		800		106
New Zealand	do	do	25.0		290		124
Peru	do	do	12.0		180		149
Do	do	do	12.0		250		108
Port Elizabeth	do	do	25.0		200		280
South Africa	do	do	27.0		210		287
Squares (England)	do	do	36.0		700		115
Washed:							
Alexandretta	do	do	25.6		251		228
Argentina	do	do					127
Beirut	do	do	28.2		269		234
Donskoi	do	do	8.0		200		90
Do	do	do	6.8		200		76
Uncompressed:							
East Africa	do	do					180
Ecuador	do	do	34.3	12	250	238	307
Uncompressed, black-face (Scotland)	do	do	40.0	8	200	192	448
N. o. s:							
China	do	do	6.8		500		30
Do	do	do	15.0		560		60
Shanghai	do	do	12.0		656		40
Donskoi	do	do	8.0		500		36
Do	do	do	6.8		500		31
East India	do	do	7.5		330		51

England	do	do	35.6		616		129
Do	do	do	44.3		460		216
Do	do	do	96.0		600		361
Do	Bag	do	96.0		500		431
Istanbul	Bale	do	32.5		224		324
Do	do	do	25.8		151		383
Larnaca	do	do	45.7		394		260
Magallanes	do	do	36.0		500		160
Tripoli	do	do	34.7		260		299
Turkey	do	do	15.6		250		140
Do	do	do	15.6		325		108
Vladivostok	do	do	33.0		375		200
Wool (specified):							
Awassi compressed (Haifa)	do	do	15.7		331		106
Carpet:							
England	Bale	None	52.5		337		349
Mersin	do	do	28.5		194		328
Scotland	Bag	do	58.0		200		659
Do	do	do	58.0		220		590
Do	Bale	do	58.0		350		373
Do	do	do	58.0		400		324
Waste (Australia)	do	do	43.5		360		271
Wool-like hair:							
Camel	do	do	8.0		415		43
Mohair (Angora goat)	do						150/200
France	Bags		3.5		23		340
Istanbul	Bale		10.7		168		141
South Africa	do	None	27.0		300		202
Do	do	do	27.0		350		172
Do	do		27.0				160
Turkey	do	None	15.6		150		233
Do	do	do	15.6		175		200
Wool cloth for men's clothing	Wood box	do	25.4	91	511	420	112
Do	do	do	21.8	82	442	360	112
Overcoatings	do	Paper wrapped	69.3	80	594	494	249
Wool cloth for women's clothing	Cloth bale, double	do	28.5	20	344	317	187
Wool felt bodies. (See Felt hat bodies, wool.)							
Wool, tops, low, foreign	Cloth bale	None	18.7	11	491	480	86
Do	do	do	20.0	13	400	387	112
Do	do	do	15.0	5	345	340	97
Woolens (England)	Bale		21.9		327		150
Do	do		11.3		133		190
Do	do		8.3		100		185
Do	do		4.3		84		116
Do	do		15.0		163		206
Do	Wood box		39.7		184		482
Do	do		29.1		342		190
Woolens (Italy)	do		16.3		281		129
Worsted yarn. (See Yarn, worsted.)							
Yacca gum. (See Gum, yacca.)							

COMMODITIES LOADED AT FOREIGN PORTS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Yarn:							
Angora (France)	Wood box		48.3		277		389
Do	do		12.7		160		178
Angora (Italy)	do		21.4		169		284
Coir	Dholl						170/190
Do	Pressed bale						120
Cotton	Wood box	Packing material	37.1	142	660	518	124
France	do		14.3		266		119
Jute	Cloth bag	8 wood cores	4.6	4	105	97	97
Linen	Wood box	Tubes	22.6	45	700	600	72
Do	Cloth bale	None	62.2	15	576	561	249
Do	Wood box	Cores	19.4	77	461	370	93
Do	do	None	21.0	79	385	306	124
Mohair	do	Carton and tubes	26.9	45	500	450	118
Do	Cloth bale	do	22.5	7	330	323	149
Rayon	Wood box	Paper tubes	16.0	68	335	230	107
Do	do	Paper hanks	11.3	55	288	217	90
Genoa	do		15.3		368		92
Italy	do		6.8		146		105
Do	do		10.8		252		96
Rayon, spun	do	Paper tubes	26.9	45	500	450	118
Do	do	Drum boards, paper	18.5	120	474	327	86
Do	do	Skeins	26.9	45	450	400	132
Do	Bale	do	22.5	5	330	323	149
Do	Wood box	Paper cones	25.6	40	362	300	160
Do	Fiber carton	Paper tubes	15.0	15	260	230	132
Rayon, viscose	do	None	10.8	8	121	113	204
Worsted	Plywood box	Paper tubes	26.9	45	500	450	118
Do	do	Skeins	26.9	45	450	400	132
Do	Cloth bale	do	22.5	5	330	323	149
Yerba mate	Coffee bag	None	6.0		94		142
Do	Peanut bag	do	10.0		110		204
Do	Wood box				150		125
Zinc:							
Chloride	Steel drum	None	7.6	28	580	522	31
Ore (see Ores and concentrates).							
Oxide	Wood barrel, paper liner	do	11.6	29	250	221	102
Marseille	Barrel		6.9		134		115
Do	do		17.7		268		147
Refined:							
East Africa	Ingots						8
South Africa	Slabs						8

CHEMICAL AND RELATED PRODUCTS

This list was compiled in 1941 for the use of vessels in the trade between the United States and the Far East. The factors are based in most cases on the short ton of 2,000 pounds and are computed from the actual weights and measurements, no allowance for broken stowage or dunnage being included. Where a stowage factor is based on the long ton (2,240 pounds), this is indicated by the letters LT.

[Gross weight shown in pounds]

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Acetaldehyde	Drum	None	815	25.8	63
Do	do	do	430	13.4	63
Do	do	do	80	2.0	50
Acetanalide	Keg	do	119	5.0	91
Acetate, transparent	Wood box		100	3.0	59
Acetic anhydride	Steel drum	None	585	13.5	47
Do	Carboy	do	200	7.5	74
Do	do	do	68	4.0	118
Do	do	do	57	3.2	114
Do	Carboy, cased	do	170	6.6	81
Do	do	do	33	1.1	67
Do	Wood box	do	29	1.2	83
Acetone	Steel drum, 110-gal		865	24.6	57
Do	Steel drum, 55-gal		445	13.4	61
Do	Steel drum		410	11.8	57
Do	do		37	1.2	65
Do	Wood box		182	11.0	121
Do	do	1 can, 5-gal	43	1.2	54
Do	do	1 can, 1-gal	21	.7	67
Acetylsalicic acid (Aspirin)	Wood barrel	None	250	9.7	80
Do	do	do	222	8.0	72
Do	Fiber container	36 bottles	27	2.0	74
Do	do	12 bottles	26	.8	57
Do	do	720 pkgs	26	.6	46
Do	do	36 pkgs	9	.2	45
Acids:					
Acetic	Wood barrel	None	500	13.3	55
Do	do	do	500	11.6	46
Do	do	do	475	12.6	53
Do	Carboy	do	165	6.6	80
Do	Wood box	2 cans	135	4.1	61
Do	Demijohn, crated	do	67	2.1	66
Acetic, glacial	Wood barrel	None	1,086	26.0	48
Do	do	do	552	13.4	48
Do	do	do	506	12.6	50
Do	do	do	481	13.3	41
Do	Demijohn	do	60	2.0	60
Benzoic	Wood barrel	do	121	5.7	50
Boric, powdered or crystal	do	do	380	12.9	67
Do	do	do	360	12.9	72
Do	Keg	do	112	4.0	71
Do	Bag	do	101	2.0	40
Do	Fiber carton		57	2.7	96
Do	do		16	.7	87
Carbolic (crystals) phenol	Wood box		49	3.0	125
Carbolic, liquid	Drum	None	505	11.5	45
Do	Drum, 110-gal	do	1,186	28.8	41
Do	Drum, 55-gal	do	588	12.9	46
Do	Drum	do	467	10.7	45
Do	do	do	333	6.6	40
Do	do	do	247	7.6	63
Do	Can	do	213	4.3	49
Chlorosulphonic	Drum	do	813	12.0	30
Chromic	do	do	434	8.5	39
Do	do	do	108	2.4	46
Do	do	do	107	1.8	34
Citric, crystals	Wood barrel	do	240	7.3	61
Do	Keg	do	125	3.7	63
Do	do	do	113	3.0	56
Do	Wood barrel	do	123	3.4	54
Do	Wood box		63	1.3	42
Cresylic (cresol liquid)	Drum	None	1,158	28.8	50
Do	do	do	527	11.6	44
Do	do	do	480	11.7	48
Do	Wood box	12 cans, 1 gal. each	133	3.0	45
Do	do	6 cans, 1 gal. each	69	1.8	52
Formic	Fiber carton		62	1.6	51
Do	Carboy, 13-gal	None	195	4.7	47
Glycerophosphoric	Carboy	do	190	6.5	68
Do	do	do	164	7.0	87
"H" acid (Aminonaphthol-disulfonic)	do	do	87	3.1	71
	Wood barrel	do	322	10.0	62

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Acids—Continued.					
Hydrochloric	Carboy	None	195	7.0	71
Do	Carboy, 12-gal	do	187	6.9	74
Do	Wood box		61	1.7	58
Hydrocyamic (prussic)	do		155	6.5	84
Hydrofluoric	do		66	3.8	117
Lactic	Wood barrel	None	585	11.1	37
Do	Carboy	do	190	4.7	49
Do	do	do	158	7.3	91
Nitric	do	do	215	6.9	64
Do	Wood box		121	4.0	66
Do	do		61	4.0	131
Oleic (red oil)	Drum	None	510	11.7	45
Do	do	do	487	11.0	45
Do	do	do	466	11.0	47
Do	do	do	457	11.7	51
Oxalic	Wood barrel	do	350	10.5	61
Do	do	do	348	9.8	55
Do	do	do	325	8.0	49
Do	Wood cask	do	139	4.9	71
Do	Drum	do	132	3.0	45
Do	Fiber drum		108	2.7	50
Phosphoric	Wood barrel	None	730	13.7	37
Do	Wood cask	do	725	12.7	35
Do	Carboy	do	226	4.8	42
Picric	Wood box		25	3.0	77
Salicylic	Wood barrel	None	175	8.6	99
Stearic	Bag	do	101	3.0	59
Do	do	do	201	4.0	40
Succinic	Wood barrel	do	351	9.0	53
Do	do	do	326	9.0	55
Do	do	do	325	10.0	61
Do	do	do	304	8.7	60
Do	Drum	do	252	9.0	71
Do	Keg	do	123	5.0	81
Sulphuric (oil of vitriol)	Drum, 110-gal	do	1,880	24.3	26
Do	Drum, 55-gal	do	920	14.1	31
Do	Carboy	do	251	6.4	51
Do	do	do	243	5.6	46
Do	Wood box		26	2.0	153
Tannic	Half barrel	None	48	5.0	247
Tartaric	Wood box	2 cans, 64 lbs. each	156	3.7	47
Tobias	Wood barrel	None	276	8.0	57
Activated carbon. (See Carbon, activated.)					
Alcohol:					
Amyl	Steel drum, 55-gal	do	426	10.7	50
Butyl (butanol)	Steel drum, 110-gal	do	865	24.6	57
Do	Steel drum	do	418	11.1	54
Do	Steel drum, 55-gal	do	410	10.7	53
Do	Steel drum, 5-gal	do	39	1.0	51
Do	Wood box		65	2.6	82
Butyl (secondary)	Steel drum	None	423	10.3	49
Butyl (tertiary)	do	do	390	10.3	51
Ethyl	Steel drum, 110-gal	do	890	25.5	57
Do	Steel drum, 54-gal	do	417	11.2	54
Do	Steel drum, 50-gal	do	380	10.3	54
Do	Steel drum, 5-gal	do	41	1.2	60
Do	Fiber carton	10 cans, 1-gal each	98	2.1	44
Isopropanol	Steel drum		423	12.0	57
Do	do		408	11.0	53
Methyl (methanol)	Steel drum, 55-gal	None	408	11.5	57
Do	Steel drum, 5-gal	do	40	1.2	61
Do	Wood box		92	5.0	110
Do	do		23	2.0	173
Do	do	One can, 1-gal	20	.8	74
Solidified	Fiber carton	72 cans, 8-oz. each	56	1.5	36
Do	do	144 cans, 3-oz. each	48	1.5	33
Alcohol, synthetic, distillate	Steel drum	None	418	11.6	56
Alum (potassium aluminum sulfate):					
Lump	Wood barrel	do	375	9.7	51
Do	do	do	359	8.9	49
Powder	do	do	375	9.0	47
Alumina sulfate	Steel drum	do	476	10.7	44
Do	Wood barrel	do	424	10.8	51
Do	do	do	424	8.9	42
Do	Bag	do	226	4.1	36
Do	do	do	204	4.3	42
Aluminum chloride	Wood barrel, 47-gal	do	605	12.0	40
Do	do	do	525	12.0	46
Do	Carboy	do	209	7.0	67

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Ammonia:					
Anhydrous	Cylinder	None	874	15.5	35
Do	do	do	391	7.2	37
Do	do	do	270	5.0	37
Do	do	do	273	5.9	43
Do	do	do	200	4.0	29
Do	do	do	110	1.6	30
Aqua	Steel drum, 110-gal	do	980	25.2	52
Do	Steel drum, 55-gal	do	487	12.7	53
Do	Wood box	Glass bottles	225	8.0	71
Do	Carboy, 13-gal	None	175	6.9	80
Do	Fiber carton	Metal cans	35	2.0	114
Do	do	12 bottles	16	.3	42
Ammonium:					
Aluminum sulfate	Wood barrel	do	375	6.3	34
Do	do	do	353	9.7	55
Do	Drum	do	320	8.4	53
Bicarbonate	Wood barrel	do	439	11.9	54
Do	do	do	125	4.0	65
Bichromate, crystals (Ammonium di-chromate)	do	None	272	7.0	51
Bifluoride	do	do	224	9.0	80
Bromide	Wood keg	do	122	1.4	23
Carbonate	Drum	do	486	10.4	43
Chloride	Wood barrel	do	300	8.0	54
Do	do	do	200	9.6	65
Do	do	do	85	2.9	67
Do	Bag	do	177	4.5	51
Do	Wood box		159	7.8	88
Do	do		109	3.0	55
Do	Wood keg	None	89	1.7	38
Meta vanadate	Drum	do	415	11.2	54
Do	do	do	382	11.0	57
Do	do	do	216	7.3	67
Nitrate	Steel drum	do	495	12.0	48
Do	do	do	460	20.0	87
Do	Wood barrel	do	322	7.2	44
Do	Bag	do	128	3.0	46
Phosphate	Wood barrel	do	374	8.1	42
Do	do	do	349	8.9	51
Do	Bag	do	111	2.4	43
Do	Wood barrel	do	162	2.8	33
Sulfate	do	do	424	10.8	51
Do	Bag	do	203	3.9	38
Do	do	do	202	4.5	44
Amyl acetate	Steel drum, 55-gal	do	441	10.7	50
Do	Drum	do	419	10.6	51
Do	Can	do	42	1.1	55
Aniline oil	Drum	do	1,063	23.9	45
Antiseptic	Fiber carton	36 bottles, 16-oz. each.	47	1.7	72
Do	do	48 bottles, 2-oz. each.	40	1.8	91
Do	do	12 bottles, 16-oz. each.	27	.7	54
Asphalt	Drum	None	565	10.7	42 LT
Do	Drum, 55-gal	do	475	9.2	43 LT
Do	do	do	460	9.2	45 LT
Do	do	do	410	9.2	51 LT
Do	Pail	do	71	1.0	32 LT
Do	do	do	64	1.0	35 LT
Do	do	do	39	.7	42 LT
Do	Bag	do	215	5.0	60 LT
Do	do	do	200	8.0	79 LT
Asphaltum	Wood box		90	2.2	56 LT
Do	do	12 cans, ½ gal. each.	62	1.6	59 LT
Do	do	6 cans, 1 gal, each	60	1.8	68 LT
Do	Fiber carton	do	53	1.6	68 LT
Do	do	12 cans, ½ gal. each.	55	1.5	61 LT
Do	Pail, 5-gal	None	42	1.1	57 LT
Do	Wood box	24 cans, 1 pint each.	35	.9	59 LT
Do	Fiber carton	do	29	.8	59 LT
Barium.					
Carbonate	Wood barrel	None	272	7.2	53
Do	Bag	do	201	2.6	26
Do	do	do	101	1.3	25
Do	do	do	51	.9	35
Chloride	Wood barrel	do	394	6.5	33
Do	Bag	do	201	4.1	42
Do	do	do	101	3.1	61

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Barium—Continued.					
Hydroxide	Wood cask	None	635	12.7	40
Do	do	do	500	6.0	24
Nitrate	Wood barrel	do	575	9.0	31
Peroxide	Drum	do	570	7.2	25
Sulfate (blanc fixe)	Wood barrel	do	422	6.5	31
Do	do	do	374	10.0	54
Do	do	do	272	6.5	48
Do	Bag	do	202	3.3	33
Do	do	do	101	1.3	26
Do	do	do	51	.9	35
Bauxite	Wood barrel	do	505	10.0	40
Do	do	do	114	10.0	182
Do	Bag	do	101	4.1	80
Beeswax, bleached	Wood box	8 units, 25 cakes each.	225	4.8	43
Belt dressing	do		34	.9	51
Benzyl acetic	do		71	1.6	46
Benzine	Drum	None	33	1.3	80
Benzoin, tincture of	Fiber carton	12 units, 12 bottles each.	39	1.2	61
Benzol	Drum, 110-gal	None	990	28.8	66 LT
Do	Drum, 55-gal	do	490	12.9	59 LT
Do	do	do	443	11.6	59 LT
Do	Wood box	Metal cans	95	2.4	56 LT
Benzyl benzoate	do		133	3.0	45
Bismuth:					
Nitrate	do		30	1.0	70
Subcarbonate	Fiber drum, 44-gal	None	272	7.6	56
Do	Fiber drum, 30-gal	do	115	5.3	95
Do	Fiber drum, 15-gal	do	108	3.7	70
Do	Fiber drum, 20-gal	do	60	3.5	118
Do	Fiber drum, 10-gal	do	56	1.8	65
Do	Fiber drum, 5-gal	do	29	.9	63
Subnitrate	Wood barrel	do	250	9.0	72
Blanc fixe. (See Barium sulfate.)					
Blasting powder (black powder)	Wood keg	do	27	.5	53
Bleaching powder	Drum	do	863	19.5	46
Do	do	do	385	8.4	43
Do	do	do	372	8.5	45
Do	do	do	359	8.1	45
Do	do	do	352	8.1	46
Do	do	do	265	4.8	36
Do	do	do	229	5.9	52
Bleaching powder (granular)	do	do	247	6.2	50
Bleaching powder (penchlor)	do	do	144	3.2	44
Bleaching powder	do	do	135	6.2	92
Do	do	do	131	3.0	46
Do	do	do	110	2.5	45
Bone ash	Wood barrel	do	473	7.6	32
Do	do	do	424	7.7	36
Do	do	do	413	7.4	36
Do	do	do	250	7.9	62
Bone black. (See Charcoal, animal.)					
Bone charcoal. (See Charcoal, animal.)					
Bone, ground	Bag	do	200	4.5	43
Box toe board	Wood crate	do	624	19.1	61
Do	Bundle	do	219	8.1	76
Do	Drum	do	442	11.7	52
Brake fluid	Wood box	Metal cans	61	1.4	45
Do	Drum	None	47	1.1	49
Do	do	do	43	1.1	54
Do	Wood box	Bottles	44	1.2	55
Brandy	do	9 bottles, 6½ lbs. each.	140	3.7	53
Bromine	do		16	1.0	122
Do	Drum, 110-gal	None	915	24.6	54
Butyl acetate	Drum	do	880	22.3	50
Do	Drum, 55-gal	do	446	11.7	52
Do	Drum	do	42	1.2	57
Do	Wood box		26	1.0	76
Do	do		17	.7	83
Do	do		11	.3	49
Do	Fiber drum	None	356	11.8	66
Caffeine	do	do	136	6.9	100
Do	do	do	124	8.0	129
Do	do	do	119	6.0	100
Do	do	do	117	4.5	77
Do	do	do	45	2.1	91

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Caffeine—Continued	Wood box	10 pkgs., 11 lbs. each.	147	5.5	74
Caffeine alkaloid	do		152	7.6	100
Do	Drum		135	6.9	102
Do	do		109	4.2	77
Caffeine alkaloid anhydride	do		88	4.9	90
Calcimine	Fiber carton		56	1.2	43
Do	Bag	None	26	.5	37
Calcium:					
Acetate	do	do	122	3.3	54
Arsenate	Drum	do	114	5.2	92
Do	do	do	112	5.1	91
Do	Fiber carton	12 bags, 4 lbs. each	52	1.4	56
Do	do	48 bags, 1 lb. each	52	1.5	57
Do	do	24 fiber cans, 1 lb. each.	33	1.4	87
Carbide	Drum	None	117	2.4	41
Do	do	do	106	1.8	34
Carbonate (chalk, limestone).	Wood keg	do	106	3.0	56
Chloride	Drum	do	418	9.0	43
Do	Bag	do	102	1.6	32
Do	do	do	101	4.1	80
Do	Wood box		75	3.0	80
Solid	Drum	None	720	8.4	23
Flaked	Fiber drum	do	422	8.4	40
Granular	Drum	do	420	8.4	40
Cyanamid	Bag	None	101	2.1	41
Cyanide	Wood box	10 cans, 5 lbs. each	83	3.4	80
Do	do	1 can, 25 lbs	42	1.7	80
Gluconate	Drum	None	134	8.0	119
Do	Wood box		125	7.0	112
Hypochlorite (lime chlorinated).	Drum	None	506	12.0	48
Do	do	do	326	8.8	54
Do	do	do	114	3.3	59
Do	Wood barrel	do	358	8.1	45
Do	Wood box		117	3.0	51
Do	do	12 cans, 3¾ oz. each.	72	1.9	53
Lactate (calcinol)	Drum	None	221	8.2	74
Phosphate	Wood box	1-lb. cans	147	6.0	81
Calcium sucrate, liquid	do		58	1.1	40
Calomel. (See Mercurous chloride.)					
Camphor, spirits of	Fiber carton	144 bottles, 1 oz. each.	38	1.2	63
Do	do	144 bottles, ½-oz. each.	24	1.1	91
Can-sealing compound. (See Compound, can sealing.)					
Carbon, activated	Drum	None	247	9.8	79
Do	do	do	240	10.7	89
Do	do	do	231	10.6	92
Do	Bag	do	37	2.5	145
Do	do	do	50	1.5	62
Carbon bisulphide	Drum	do	660	13.0	39
Do	do	do	600	12.0	40
Do	do	do	62	1.0	33
Carbon, charcoal	Bag	do	52	4.1	128
Do	do	do	52	3.5	133
Do	do	do	52	2.6	102
Carbon dioxide	Cylinder	do	212	3.0	29
Carbon tetrachloride	Drum, 110-gal	do	1,610	25.5	32
Do	Drum, 55-gal	do	805	13.0	32
Do	Drum, 52½-gal	do	750	11.0	29
Do	Drum, 10-gal	do	139	2.2	31
Do	Drum, 5-gal	do	72	1.8	49
Do	Crate	Metal cans	168	4.5	53
Do	Wood box	do	107	4.0	74
Do	Fiber carton	do	60	1.8	59
Carboxide, liquefied	Cylinder	None	134	1.6	24
Cartridges:					
Revolver, 38-caliber	Wood box		131	.6	15
Safety metallic	do		104	.7	14
Revolver, 45-caliber	do		101	.7	14
Rifle	do		85	.7	17
Safety metallic	do		75	.6	16
Safety, shotgun, loaded	do		60	.8	27
Castor oil. See Oil.					
Caustic potash (Potassium hydroxide).	Drum, crated	None	123	3.0	48
Do	Drum	do	107	2.0	35

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Caustic soda	Drum	None	753	7.9	21
Do	do	do	740	8.0	22
Do	do	do	717	8.0	22
Do	do	do	696	7.9	22
Do	do	do	677	8.0	23
Do	do	do	476	10.0	42
Do	do	do	420	8.7	41
Do	Wood box	Metal cans	52	1.4	57
Do	Fiber carton	do	48	1.1	48
Cellosolve	Drum	None	425	11.3	53
Do	do	do	39	1.0	51
Celluloid	Fiber drum	do	198	6.5	65
Do	do	do	160	4.1	51
Do	do	do	145	4.1	58
Do	do	do	85	2.3	54
Cellulose, absorbent	Fiber carton		57	14.0	491
Do	do		40	9.8	490
Cellulose acetate	Wood box		173	6.5	75
Do	do		107	3.9	74
Do	do		35	1.0	53
Do	Bag	None	102	6.5	127
Do	Fiber carton		56	3.5	123
Cellulose film	Wood box		495	12.3	50
Do	do		480	13.0	53
Do	do		468	12.6	54
Do	do		246	6.0	50
Do	do		193	5.0	52
Do	do		467	8.0	34
Do	do		391	7.0	35
Do	do		206	5.2	50
Do	do		195	5.4	55
Do	do		175	4.7	54
Ceric oxide	Wood barrel	None	403	9.0	44
Cerium oxalate. (See Cerous oxalate.)					
Cerous oxalate	do	do	275	10.0	72
Chalk, limestone. (See Calcium carbonate.)					
Charcoal, animal	do	do	301	7.6	52
Do	do	do	298	7.6	52
Do	do	do	246	7.6	63
Do	do	do	243	7.6	63
Charcoal carbon. (See Carbon, charcoal.)					
Charcoal, lump	Bag	do	41	6.3	286
Do	do	do	5	.4	250
Charcoal, wood	do	do	41	5.0	250
Do	do	do	8	.6	154
Chlorate of potash	Drum	do	238	4.5	38
Do	do	do	224	4.5	40
Do	do	do	182	3.8	42
Do	do	do	122	2.1	38
Do	Wood box		128	2.4	37
Chloride of lime	Drum	None	385	8.6	45
Do	do	do	360	8.9	49
Do	do	do	339	8.4	49
Do	do	do	121	2.4	39
Do	do	do	109	2.5	47
Chloride of potash	Wood barrel	do	274	9.7	70
Do	do	do	247	5.6	45
Do	Bag	do	202	4.2	47
Do	Wood cask	do	127	3.1	49
Do	Drum	do	121	2.3	38
Chlorine, liquid	Cylinder	do	3,350	42.5	25
Do	do	do	273	3.5	25
Do	do	do	193	2.7	27
Do	do	do	157	2.6	33
Chloroform	Drum, 55-gal	do	750	13.0	34
Do	Drum	do	152	3.0	40
Do	Drum, 10-gal	do	139	2.2	31
Do	Drum, 1-gal	do	72	1.0	28
Chloropicrin. (See Nitrotrichloromenthane.)					
Chromic oxide (chromium oxide)	Wood barrel	do	320	7.4	46
Do	do	do	111	3.0	52
Cleaning compound, boiler	Drum	do	55	1.5	53
Cleaning fluid, n. o. s	Wood box		23	1.0	86
Coal tar:					
Dye, paste	Wood barrel	None	300	7.3	48
Do	do	do	143	4.3	60
Dye, (Calcimine green)	Drum	do	268	7.6	56
Dye	do	do	136	4.0	58
Do	do	do	110	2.5	60

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Coal tar—Continued.					
Dye—Continued	Wood keg	None	148	6.0	81
Do	do	do	124	5.0	80
Dye, liquid	Wood box		51	3.0	110
Naphtha, crude	Drum	None	441	12.6	57
Oil	do	do	460	11.0	47
Do	do	do	446	7.5	33
Cobaltus acetate	do	do	100	4.2	84
Cobaltus oxide	Wood barrel	do	629	9.8	31
Do	do	do	390	6.0	30
Do	Drum	do	382	8.0	41
Do	Wood barrel	do	365	5.5	30
Coblac	Drum	do	60	1.8	61
Do	do	do	60	1.6	55
Cognac	Wood box	Bottles	47	1.3	58
Color lakes	Drum	None	691	12.0	35
Do	do	do	354	6.7	37
Do	Pail, 5-gal	do	61	1.2	37
Collodium	Drum	do	410	13.0	63
Do	do	do	400	11.0	55
Compound, can-sealing, liquid	do	do	55	1.0	55
Do	do	do	52	1.0	52
Copper acetate	Plywood drum	do	465	10.0	42
Do	Wood barrel	do	125	5.0	80
Copper acetoarsenite. (See Paris green.)					
Copper carbonate	Wood barrel	do	276	10.0	71
Do	do	do	226	10.0	87
Do	Fiber carton		55	1.6	54
Do	do		55	1.2	44
Copper oxide	Wood barrel, 50-gal	None	1,025	12.8	25
Do	Drum, 25-gal	do	526	5.0	19
Do	Drum	do	208	2.0	18
Do	Fiber carton		104	1.1	20
Copper sulfate:					
Granular crystals	Wood barrel	None	524	10.0	38
Large crystals	do	do	477	10.0	42
Powdered	do	do	424	10.0	47
Do	Bag		102	1.5	29
Monohydated	Drum	do	415	9.5	45
Do	do	do	211	4.7	44
Basic	do	do	107	2.6	49
Do	Fiber carton		55	1.0	37
Cream of tartar. (See Potassium bitartiate.)					
Cuprex (insecticide)	Wood box		8	1.0	250
Cyanamid	Bag	None	112	2.5	44
Cyanide, crude	Drum	do	218	4.5	41
Cylinders, acetylene, empty	None	do	237	3.3	28
Do	do	do	196	3.5	35
Cylinders, gas, empty	do	do	132	2.6	40
Cylinders, oxygen, empty	do	do	169	2.8	33
Do	do	do	162	2.8	34
Do	do	do	132	2.6	40
Degras (sod oil)	Drum	do	486	11.6	48
Diacetone alcohol, tech	Drum, 110-gal	do	965	24.6	51
Do	Drum, 5-gal	do	45	1.0	44
Dibutyl phthalate	Drum, 110-gal	do	1,065	24.6	46
Do	Drum	do	522	11.7	45
Do	Drum, 5-gal	do	46	1.2	54
Dichlorobenzene, para	Wood barrel	do	274	9.6	68
Do	Fiber drum	do	217	5.6	51
Do	Drum	do	216	6.9	64
Dichlorodifluoro-menthane	Cylinder	do	214	3.2	30
Do	do	do	49	.7	30
Diethyl phthalate	Drum	do	551	11.0	39
Diethyl sulphate	do	do	51	1.0	39
Diethylamine	do	do	364	12.0	65
Diethylene glycol monoethyl ether.	do	do	46	2.6	117
Dimethyl sulfate	do	do	625	13.0	41
Do	do	do	121	2.5	41
Dinitrochlorobenzene	do	do	1,483	23.4	31
Disodium phosphate, anhydride	Wood barrel	do	349	8.5	49
Do	do	do	324	12.0	74
Do	Bag	do	101	2.5	51
Dye intermediate (para nitro phenol).	Wood barrel	do	382	12.2	70
Dynamite	Wood box, tin lined		59	1.2	42
Do	do		57	1.1	39

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Ergot	Wood box		173	6.6	76
Do	do		159	5.2	66
Do	Drum	None	127	5.0	78
Essential oils	Wood box		171	8.4	98
Ether	Drum	None	420	11.5	54
Do	Wood box		110	4.2	76
Ethyl acetate	Drum, 110-gal	None	915	24.6	54
Do	Drum	do	451	10.7	47
Do	do	do	415	11.5	55
Do	do	do	42	1.2	57
Do	Wood box		53	1.6	60
Do	do		21	.5	43
Do	do		8	.3	75
Ethyl aceto-acetate	Drum	None	503	11.2	50 LT
Ethyl chloride	Wood box		356	21.0	117
Do	do		61	3.3	108
Do	do		51	4.0	156
Ethyl ether (other than anesthetic).	Drum	None	374	12.0	64
Do	do	do	364	11.0	60
Do	do	do	351	10.7	60
Ethyl lactate	do	do	469	10.6	45
Ethyl vanillin	Can, paper liner		6	.2	77
Ethylene dichloride—carbon tetrachloride mixture (cleaning compound).	Wood box	Cans	104	3.0	57
Do	do	do	57	1.7	60
Do	do	do	50	1.0	40
Do	Crate	do	99	3.0	60
Do	do	do	45	2.0	88
Ethylene glycol	Drum	None	550	11.5	43
Do	do	do	52	1.2	46
Do	Wood box	1 can, 1 gal	13	.3	41
Ethyline glycol monobutyl ether (butyl cellosolve).	Drum	None	425	11.1	49
Ethylene oxide	Cylinder	do	43	1.0	46
Feldspar, ground	Wood barrel	do	370	7.3	39
Do	Bag	do	101	.9	19
Ferric chloride, crystals	Drum	do	161	3.4	42
Ferric chloride, lump	do	do	120	3.0	40
Ferric ferrocyanide	Wood barrel	Paper liner	328	14.9	91
Ferro vanadium	do	None	933	5.0	10
Do	Drum	do	350	3.0	17
Fertilizer, n. o. s.	Bag	do	222	4.1	37
Do	do	do	202	6.0	59
Do	do	do	201	4.2	42
Do	do	do	201	3.9	39
Do	do	do	168	3.8	44
Do	do	do	126	3.1	50
Do	do	do	101	2.7	54
Do	do	do	101	2.4	47
Fiber sheet packing	Wood box		410	14.0	68
Fiber sheets, vulcanized	Bale	None	787	18.5	47
Do	do	do	748	22.0	58
Do	Wood box		733	15.0	41
Do	Rolls	None	103	2.4	46
Do	do	do	76	1.5	40
Do	Wood box		95	7.0	147
Fiber, vulcanized, n. o. s.	do		1,038	22.0	42
Do	do		852	18.0	42
Do	do		721	18.0	49
Do	do		695	15.0	43
Do	do		682	17.0	49
Do	do		597	33.0	110
Do	do		545	15.3	56
Do	Bale	None	682	17.0	49
Do	do	do	601	16.3	54
Do	Rolls	do	201	4.0	39
Do	do	do	113	2.1	34
Do	do	do	55	1.4	49
Fire extinguisher recharges	Wood box		81	2.4	58
Fire extinguisher refills	do		83	2.0	40
Flares, parachute	do		194	4.7	48
Flaxseed (linseed)	Wood barrel	None	262	9.3	73
Flotation oil	Drum	do	556	11.5	41
Flotation reagent	do	do	353	9.5	54
Do	do	do	272	9.0	71
Do	do	do	242	7.3	60
Do	do	do	234	7.7	66
Do	do	do	216	5.5	51
Do	Wood box		33	1.0	60

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Flux	Wood box	Metal cans	185	7.0	75
Do	do	do	100	2.6	53
Do	do	do	75	1.7	46
Do	do	do	58	1.3	40
Do	Drum	None	53	1.1	43
Fly spray (Flit)	Wood box	Metal cans	221	6.0	54
Do	do	do	58	1.7	60
Formaldehyde (Formalin)	Wood barrel	None	2,640	67.0	50
Do	Drum	do	579	10.4	35
Do	do	do	575	12.0	41
Do	Wood barrel	do	525	13.4	51
Do	do	do	525	8.5	32
Do	do	do	523	12.6	48
Do	do	do	515	13.0	49
Do	do	do	150	4.3	57
Do	Carboy	do	82	3.0	73
Freon (Trichlorotrifluoroethane)	Cylinder	do	214	3.7	35
Gases, compressed, n. o. s.	do	do	187	2.6	27
Do	do	do	129	1.3	20
Gasoline (ethyl fluid)	Drum, 55-gal	do	916	12.7	27
Gasoline	Drum	do	413	10.7	57
Gasoline (highest 88°-90°)	do	do	356	12.0	80
Glycerin	do	do	1,310	20.9	31
Do	do	do	1,210	20.9	34
Do	do	do	680	11.7	34
Insecticides, liquid, n. o. s.	Wood box	12 cans, 1 gal. each	117	3.0	51
Do	do		93	4.0	86
Do	do	24 cans, 1 quart each	62	1.9	58
Do	Fiber carton	do	56	1.7	58
Do	do	6 cans, 1 gal. each	54	1.6	58
Do	Steel pail, 5-gal		44	1.1	49
Do	Fiber carton	24 cans, 1 pint each	26	.7	51
Insecticide, powder	do	12 pkgs., 2 lbs. each	26	.8	61
Iodine crystals	Wood keg	None	167	2.0	23
Iron ferrocyanide. (See Ferric ferrocyanide.)					
Iron nitrate	Carboy	do	230	6.9	60
Iron oxide, red	Wood barrel	do	573	11.7	40
Do	do	do	573	7.7	26
Do	do	do	433	10.0	47
Do	do	do	300	10.8	72
Do	do	do	178	11.0	124
Do	Wood keg	do	106	2.0	37
Iron perchloride	Wood barrel	do	725	11.9	32
Iron sulfate	do	do	425	10.0	46
Do	Fiber carton	144 pkgs., 4 oz. each	57	2.7	95
Iron sulfide	Wood barrel	None	536	5.0	18
Iso-octane (gasoline)	Wood box	Metal containers	44	1.0	45
Kerosene	Drum	None	466	13.0	64 LT
Do	do	do	380	10.7	64
Do	Wood box	Metal containers	85	1.8	48
Lanolin, hydrous	Drum	None	113	2.5	44
Lead acetate (sugar of lead)	Wood cask	Paper liner	586	12.7	43
Do	Wood barrel	None	528	9.6	36
Do	do	do	459	9.0	38
Do	Wood keg	do	106	5.0	93
Do	Drum	do	105	1.8	34
Lead arsenate	do	do	112	5.1	91
Do	Fiber carton	10 bags, 5 lbs. each	54	1.5	55
Do	do	50 cartons, ½ lb. each	38	1.8	95
Lead nitrate	Wood barrel	Paper liner	418	4.8	23
Do	Fiber drum	None	105	1.3	24
Leather dressing, n. o. s.	Drum	do	492	11.0	44
Do	Wood barrel	do	470	12.0	51
Do	Wood box	do	100	2.3	46
Do	Pail	do	49	1.1	44
Licorice extract	Wood box		289	4.9	33
Do	Drum		130	4.2	64
Do	Fiber carton		54	.8	27
Lighter fluid	Wood box	Metal containers	63	3.0	95
Lime citrate	Wood barrel	Paper liner	173	6.9	80
Do	Fiber drum	None	114	5.3	95
Do	Bag	do	102	2.7	52
Linseed oil. (See Oil, linseed.)					
Lithium chloride	Drum	do	112	2.7	49
Lithium hydroxide, crystals	Wood box		557	17.0	61
Lubricating grease	Drum, 55-gal	None	458	12.0	60 LT
Do	Half drum	do	250	6.7	63 LT
Do	Drum	do	253	6.0	52 LT
Do	do	do	116	2.8	55 LT

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Lubricating grease—Continued	Wood barrel	None	523	11.6	50LH
Do	Wood box	Metal cans	110	2.2	47 LT
Do	do	do	85	3.0	71 LT
Do	do	do	71	2.1	60 LT
Do	do	do	36	1.2	70 LT
Do	do	do	40	.7	38 LT
Do	Fiber carton	do	38	1.2	70 LT
Lubricating oil:					
Soluble mineral oil	Drum	None	540	12.7	47
Do	Drum, 55-gal	do	480	10.8	45
Textile	Drum	do	462	10.7	52
Batching	Drum, 55-gal	do	448	10.7	48
White, pet. comm. mineral	Drum	do	434	12.0	60
Do	do	do	285	10.7	87
Lubricating oil	Drum, 5-gal	do	43	1.1	57 LT
Do	Wood barrel	do	280	7.9	64 LT
Do	Wood box	Metal cans	235	8.0	77 LT
Do	do	Metal cans, 3 oz. each.	122	4.8	90 LT
Do	do	Bottles in cartons	110	7.0	140 LT
Do	do	8 cans, 1 gal. each	103	2.0	44 LT
Do	do	Metal cans	95	2.0	47 LT
Do	do	24 cans, 1 qt. each	67	1.7	56 LT
Do	Pail	None	42	1.1	58 LT
Do	Fiber carton	Metal cans	31	1.0	70 LT
Do	do	do	45	1.0	49 LT
Do	Wood box	do	22	1.0	102 LT
Lysol (disinfectant)	do		87	3.4	78
Magnesium:					
Borate	Wood barrel	None	330	12.8	77
Carbonate	Bag	do	52	3.9	151
Chloride, flaked	Drum	do	367	8.3	45
Do	Bag	do	102	2.3	45
Hydroxide	Wood box		117	4.3	74
Silkofluoride, crystals	Wood barrel		428	7.2	33
Acetate	do	None	425	9.4	44
Do	Fiber carton		210	3.2	29
Manganese dioxide	Wood barrel	None	650	8.0	24
Do	Bag	do	111	1.2	22
Do	do	do	104	1.0	20
Manganous sulfate	do	do	101	2.7	52
Do	Wood box		67	3.0	89
Matches	do	Waterproof paper.	64	3.3	103
Strike anywhere	Fiber carton		42	2.6	122
Book	do		30	1.5	98
Mecuric chloride (corrosive sublimate).	Wood cask	None	278	3.6	26
Mecuric chloride	Wood box		265	5.8	42
Do	do		130	1.4	21
Do	do		127	2.4	37
Do	Fiber drum	None	104	1.0	18
Do	do	do	53	.5	20
Mecuric iodine	do	do	106	1.9	36
Medicinals (ointments)	Drum		450	11.8	52
Do	Fiber carton	6 jars, 4 oz. each	65	1.9	58
Do	do	12 jars, 16 oz. each	18	.5	51
Do	do	144 jars, 1 oz. each	16	.7	91
Medicinals, proprietary	do	6 cans, 10 oz. each	48	1.1	44
Do	do		38	1.2	62
Do	do	24 bottles, 6 oz. each.	31	.7	44
Do	do	12 bottles, 16 oz. each.	28	.8	54
Do	do	12 bottles, 12 oz. each.	21	.7	66
	do		125	3.4	54
Mentholatum	Wood barrel		228	3.6	31
Mercurous chloride	Fiber drum		104	1.0	19
Do	do		53	.5	20
Do	do		27	.3	19
Do	Flask		90	.3	7
Mercury	Pail		27	.8	58
Ammoniated	Drum		27	1.0	74
Oxide	Drum, 110-gal		1,158	28.8	50
Meta cresol	Drum, 55-gal		574	12.9	44
Do	do		527	11.6	44
Do					
Methyl:	Drum	None	440	11.5	53
Acetone	do	do	431	11.0	51
Amyl acetate	Aluminum bottle	do	6	.2	54
Anthranilate	Drum	do	483	11.1	46
Cellosolve	do	do	460	11.1	48
Do					

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Methyl—Continued.					
Cellosolve—Continued	Drum	None	399	10.0	50
Do	do	do	275	6.6	49
Do	do	do	55	1.0	39
Do	do	do	46	.6	26
Chloride	Cylinder	do	159	3.2	40
Do	do	do	117	3.0	51
Isobutyl ketone	Drum	do	403	11.0	54
Ketone	do	do	418	10.3	49
Salicylate	Wood box		62	1.2	40
Methylamine	Drum, 110-gal		965	24.6	51
Do	Drum, 55-gal		495	13.4	54
Do	Wood box	1 can, 5-gal	50	1.2	46
Mica, powdered	Bag	None	102	3.5	68
Mineral colza oil	Drum, 55 gal	do	427	10.7	56 L/T
Do	Wood box		94	2.1	51
Moth flakes. (See Naphthalene.)					
Moulding compounds, n. o. s	Fiber drum	None	273	14.2	105
Naphtha	Fiber carton	12 cans, 1 qt. each	36	.6	37
Do	do	12 bottles, 5 oz. each.	12	.3	51
Naphthalene:					
Crude	Wood barrel	do	244	10.0	83
Do	Bag	do	228	6.5	57
Flakes	Wood barrel	do	225	8.9	80
Green	Drum, 60-gal	None	490	12.3	50
Do	do	do	480	12.3	51
Do	Drum, 35-gal	do	280	9.0	64
Do	Drum, 30-gal	do	241	4.8	39
Do	Drum, 15-gal	do	125	3.5	55
Moth flakes	Fiber carton	Cans	50	2.4	96
Refined	Wood barrel	Paper liner	273	9.0	66
Do	do	do	209	10.0	95
Do	Bag	do	132	4.6	69
Napthol, beta	Wood barrel	do	354	12.8	72
Do	Plywood drum	None	235	7.5	63
Do	Bag	do	101	2.2	44
Nickel:					
Chloride	Wood barrel	do	579	13.0	44
Oxide	do	do	960	10.1	21
Do	Wood keg	do	460	5.4	23
Salts	Wood barrel	do	450	9.6	42
Sulfate	do	do	448	9.6	42
Nicotine sulfate	Drum	do	643	13.0	40
Do	do	do	575	11.3	39
Nigrosine	do	do	134	4.6	68
Nitrate of soda	Wood barrel	do	527	10.0	38
Do	Bag	do	202	4.0	44
Nitrotrichloromenthane	Cylinder	do	250	4.1	33
Nitro-benzene (oil of mirbane)	Drum	do	650	12.0	37
Nitrocellulose	Wood barrel	do	296	12.0	80
Do	do	do	272	12.0	87
Do	Drum	do	338	10.8	64
Nitrocelulose solutions	Drum, 55-gal	do	572	13.0	44
Do	Drum, 50-gal	do	539	11.9	45
Do	Drum	do	506	10.8	42
Do	Drum, 55-gal	do	489	13.0	38
Do	Drum, 50-gal	do	464	11.9	39
Oakum	Bale	do	47	2.5	105
Ochre, ground	Wood barrel	do	320	8.9	56
Do	Wood cask	do	111	3.0	52
Octol (auxiliary textile chemical)	Wood barrel	do	156	5.4	69
Oil:					
Almond, sweet	Drum	do	460	10.3	45
Do	Wood box	2 cans	91	2.0	45
Do	Fiber carton	1 can	32	1.4	87
Camphorated	do	72 bottles, 4 oz. each.	49	1.6	65
Do	do	144 bottles, 1 oz. each.	39	1.2	61
Castor	Drum	None	950	18.0	38
Do	do	do	450	12.0	53
Do	Drum, 5-gal	do	45	1.1	51
Do	Wood barrel	do	221	8.0	72
Do	Wood box		98	1.2	44
Do	do	2 cans, 5 gal. each	97	1.8	37
Do	do		63	1.9	62
Do	do	1 can, 5 gal	63	1.6	53
Do	do		47	1.0	42
Do	Fiber carton		65	1.7	65
Do	do		45	1.5	68

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Oil—Continued.					
Castor—Continued	Fiber carton	144 bottles, 1 oz. each.	39	1.2	61
Do	do	144 bottles, ½ oz. each.	25	.7	54
Cedarwood	Drum	None	699	20.0	57
Clove	do	do	534	12.7	47
Do	Wood box	2 cans, 60 lbs. each.	141	4.5	64
Do	do	1 can, 60 lbs	87	1.7	38
Do	Fiber carton	1 can, 25 lbs	28	1.4	100
Coal tar. (See Coal-tar oil.)					
Coconut	Drum	None	450	11.0	49
Do	do	do	113	3.0	48
Do	Fiber carton	72 bottles, 4 oz. each.	49	1.6	65
Do	Pail	None	28	.8	57
Cod	Drum	do	473	10.8	45
Cod liver	do	do	480	10.7	44
Do	do	do	462	10.4	45
Do	do	do	295	7.6	51
Do	do	do	250	6.3	50
Do	do	do	135	3.0	44
Do	Wood barrel	do	280	7.0	50
Do	Wood box		61	3.0	98
Do	Fiber carton	12 bottles, 32 oz. each.	42	1.2	57
Cooking, n. o. s.	Drum	None	480	13.5	56
Cottonseed	do	do	450	12.0	52
Do	Wood box		97	2.2	46
Do	do		75	4.0	106
Do	Fiber carton		57	1.0	35
Do	do		28	.6	42
Creosote	Wood barrel	None	580	11.3	38
Do	do	do	506	10.7	42
Do	Wood box	12 cans, 1 gal. each.	135	3.0	44
Do	Pail, 5-gal	None	50	1.1	43
Do	Fiber carton	6 cans, 1 gal. each.	63	1.6	51
Flotation. (See Flotation oil.)					
Fusel	Drum	None	440	10.6	47
Do	Drum, 55-gal	do	423	11.6	55
Do	Drum, 5-gal	do	39	1.2	61
Halibut liver	Fiber carton	22 bottles in cartons.	51	2.2	87
Do	do	14 bottles in cartons.	15	.6	80
Lemon	Drum	None	435	10.3	47
Do	Wood box		84	2.0	47
Do	do		186	6.5	69
Linseed	Drum	None	485	11.0	45
Do	do	do	425	11.0	51
Do	Fiber carton	6 cans, 1 gal. each.	53	1.2	44
Do	Wood box		47	1.1	45
Do	Pail	None	45	1.1	47
Do	Wood box		30	2.0	133
Do	Drum	None	43	1.0	50
Mineral	do	do	448	12.0	53
Do	Wood box		70	3.0	85
Mustard seed	Drum, 55-gal	None	424	10.7	50
Neatsfoot	Drum	do	466	10.8	46
Do	do	do	436	10.6	48
Oleo	Wood tierce	do	149	11.9	53
Olive	Drum	do	495	12.0	48
Do	do	do	475	13.0	55
Do	Wood box	2 cans, 6 gal. each.	115	2.4	42
Do	do		111	2.9	52
Do	do	6 cans, 1 gal. each.	62	1.4	32
Do	Fiber carton	12 cans, 1 qt. each.	46	1.3	57
Olive, inedible	Drum	None	450	12.0	52
Orange	do	do	435	10.3	47
Do	Wood box	2 cans, 35 lbs. each.	84	2.0	47
Do	do	2 cans, 25 lbs. each.	68	1.4	41
Peanut	Wood barrel	None	460	13.0	35
Do	Drum, 55-gal	do	424	10.7	40
Peppermint	Wood box		80	3.1	79
Do	do		71	2.5	63
Pine	Drum, 55-gal	None	476	11.2	47
Plate. (See Plate oil.)					
Red. (See Acid, oleic.)					
Rosin	Drum	do	517	12.0	47
Do	do	do	498	11.3	45
Sole leather	Wood barrel	do	470	11.9	50
Tanners	do	do	527	12.4	47

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Oil—Continued.					
Transil and transformer	Drum, 55-gal	None	455	10.7	53
Vegetable	Wood barrel	do	536	12.0	44
Do	do	do	251	3.0	24
Vegetable, solidified	Drum	do	235	6.0	52
Oxo-Bardeaux (insecticide)	do	do	112	5.0	89
Oxygen	Cylinder	do	330	42.0	254
Do	do	do	90	15.0	333
Packing, twisted jute	Bale	do	51	2.1	85
Paraffin wax	Wood barrel	do	425	13.9	72 LT
Do	do	do	397	13.3	75 LT
Paraffin wax, scale	Drum, 55-gal	do	419	12.0	64 LT
Do	Wood box		265	5.8	48 LT
Do	do		124	3.0	53 LT
Do	Bag	None	222	4.2	42 LT
Do	do	do	177	3.5	44 LT
Do	do	do	111	2.1	43 LT
Do	Wood box	do	45	1.0	49 LT
Paraffin wax, scale, yellow crude	Wood barrel	do	293	9.0	70 LT
Do	do	do	290	9.8	74 LT
Do	do	do	279	8.6	69 LT
Paris green (copper acetoarsenite)	Drum	do	279	6.4	44
Do	do	do	110	2.4	44
Do	Wood box	200 pkgs., ¼ lb. each	80	1.9	48
Do	Fiber carton	24 fiber cans, 1 lb. each	29	.7	48
Do	Can	None	17	.3	33
Paste, indigo	Drum, 58-gal	do	445	9.9	44
Do	Wood bbl., 20-gal	do	183	6.0	64
Do	Keg	do	180	5.2	57
Do	Drum	do	155	4.4	56
Do	Pail	do	40	1.2	56
Pectin	Wood box	2 cans, 5 gal. each	100	1.9	38
Do	Fiber carton	144 pkgs., 3 oz. each	40	1.4	71
Do	do	24 bottles, 8 oz. each	30	.8	52
Peppermint, essence of	do	144 bottles	40	1.2	54
Peroxide of hydrogen	Drum, 30-gal	None	282	5.3	37
Do	Carboy	do	225	12.0	106
Do	do	do	190	7.5	78
Do	do	do	190	4.7	49
Do	Fiber carton		48	1.5	62
Do	do		45	1.3	59
Do	do		24	1.4	61
Petrolatum, n. o. s.	Wood bbl., 50-gal	None	450	12.4	62
Do	Wood bbl., 30-gal	do	280	7.9	64
Petroleum cleaning compound, n. o. s.	Fiber carton	6 cans, 1 gal. each	60	1.1	35
Do	do	24 cans, 8 oz. each	18	.4	47
Petroleum grease	Drum, 55-gal	None	455	12.0	60
Do	Wood box		91	4.0	90
Petroleum solvent "A" (Stanvac).	Drum	None	406	10.7	53
Do	Wood box		74	2.4	65
Phenolite	do		528	13.6	51
Phosphate acid	Wood barrel	None	287	12.5	87
Phosphate of lime	do		349	9.6	55
Do	do		348	9.0	51
Do	do		325	9.6	59
Phosphorus, amorphous, red	Wood box		140	4.0	57
Phosphorus oxychloride	Drum, 55-gal	None	1,035	12.1	23
Do	Drum	do	1,027	14.0	27
Do	Lead carboy	do	305	3.9	25
Phosphorus, yellow	Drum	do	473	7.8	32
Do	do	do	400	5.9	68
Do	Wood box, tin lined	10 cans, 11 lbs. each	178	3.2	55
Phosphorus, n. o. s.	Drum	None	122	2.8	45
Do	Wood box		179	5.0	55
Pitthalic anhydride	Wood barrel	Paper liner	300	9.0	60
Do	Bag	None	101	2.9	57
Pitch:					
Liquid	Wood barrel	do	480	10.5	43
Do	Pail	do	53	1.1	43
Wood	Can	do	398	8.0	40
Roofing	Wood box	12 cans, 1 gal. each	144	3.0	48
Do	Pail, 5-gal	None	55	1.1	51
Do	Fiber carton	4 cans, 1 gal. each	45	1.0	45
Pitch, n. o. s.	do		41	2.0	89
Plate oil	Drum	None	484	11.0	45
Polish, shoe	do	do	487	11.0	45
Do	Wood box		103	3.0	58

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Polish, shoe—Continued	Wood box		102	3.8	74
Do	do		84	2.9	68
Do	do		83	3.6	88
Do	do		78	2.5	59
Do	Fiber carton		38	1.2	65
Potash (potassium), bichromate of:	Wood cask	None	870	14.5	33
Do	do	do	850	15.0	34
Do	do	do	820	13.0	31
Do	do	do	808	15.0	36
Do	Wood box		870	13.0	29
Do	Wood barrel	None	712	12.4	51
Do	do	do	475	8.0	34
Do	Drum	do	106	1.0	18
Potash, n. o. s.	do	do	31	.9	59
Potassium bitartrate (cream of tartar).	Wood barrel	Paper liner	374	10.0	54
Do	do	None	273	7.0	51
Do	do	do	250	6.6	52
Do	do	do	113	3.1	55
Do	Fiber carton	144 pkgs., 4 oz. each.	57	2.7	95
Do	Wood box		56	1.1	38
Potassium carbonate	Wood cask	None	860	25.5	58
Do	Wood barrel	do	449	9.6	42
Do	do	do	423	8.6	41
Do	do	do	396	8.1	41
Do	do	do	375	9.6	60
Do	Fiber drum	do	215	5.0	46
Do	do	do	29	.8	51
Potassium chlorate	Drum	do	213	5.2	43
Potassium cyanide	Wood box		198	4.9	50
Do	Drum	None	110	2.8	50
Do	do	do	56	1.4	41
Potassium ferrocyanide	Wood barrel	do	415	6.3	30
Do	do	do	396	9.6	48
Do	do	do	240	9.0	74
Do	Wood cask	do	125	3.1	50
Do	do	do	115	3.1	54
Potassium ferrocyanide crystals	Wood box		245	8.0	65
Potassium:					
Hydroxide. (See Caustic potash.)					
Iodine	Fiber drum, 25-gals		265	4.4	33
Do	Fiber drum, 10-gals		106	1.8	34
Do	Fiber drum, 5-gals		54	.9	34
Do	Fiber drum, 2½-gals		28	.4	31
Do	Wood box		262	6.4	48
Do	do	Stone jar, 1 gal	47	1.3	57
Nitrate, refined	Bag		222	3.1	28
Nitrate	Wood box	12 pkgs., 4 oz. each.	57	2.7	95
Do	Fiber carton		16	.7	32
Perchlorate	Wood barrel	None	247	4.5	36
Do	Drum	do	118	2.0	33
Permanganate	do	do	630	10.7	34
Do	do	do	117	2.0	35
Do	Fiber carton	12 pkgs., 2 oz. each.	33	1.7	112
Sodium tartrate	Wood barrel	Paper liner	347	10.0	57
Do	do	do	268	7.3	54
Do	do	do	250	6.6	52
Do	do	do	125	3.4	53
Do	do	do	111	3.3	60
Do	Fiber carton	144 pkgs., 4 oz. each.	57	2.7	95
Pyridine	Drum, 110-gal	None	1,096	28.8	52
Do	Drum, 55-gal	do	496	11.6	46
Do	Wood box	15 tin bottles	103	3.5	66
Pyridine, denaturing	Wood barrel	None	470	11.6	49
Do	Drum	do	478	11.0	47
Pyroxylin solvent (Nitrocellulose alcohol, wet).	Can, boxed	do	19	1.2	130
Quicksilver (mercury)	Wood box		60	1.5	50
Reducing compound, lacquer	Drum	None	390	11.3	58
Do	do	do	40	1.0	50
Do	Fiber carton	Cans	49	1.0	40
Resin, synthetic	Drum	None	500	9.2	37
Resin, synthetic (moulding compound).	do	do	329	10.7	65
Resin, synthetic	do	do	325	9.8	60
Do	do	do	310	6.8	43
Do	Wood box		137	2.3	33
Do	do		52	2.0	77
Road binding material	Drum	None	529	11.6	44
Do	do	do	515	12.7	49
Rosin	do	do	581	9.0	34 LT

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Rosin—Continued	Drum	None	564	9.5	37 LT
Do	do	do	413	8.6	45 LT
Do	Wood barrel	do	500	13.0	54 LT
Do	do	do	500	11.5	52 LT
Do	do	do	488	12.0	55 LT
Rosin, crude	Drum	do	517	10.8	46 LT
Rosin, gum	Wood barrel	do	740	18.0	53 LT
Do	do	do	516	9.5	41 LT
Do	do	do	497	9.0	41 LT
Do	do	do	496	12.0	54 LT
Do	Drum	do	576	12.0	46 LT
Do	do	do	562	9.5	37 LT
Rosin, wood	do	do	532	12.0	50 LT
Do	do	do	530	9.5	40 LT
Rubber cement	do	do	411	11.6	56
Do	do	do	70	2.2	64
Do	Wood box	Metal cans	59	1.0	33
Do	do	do	43	1.3	62
Do	Fiber carton	1 can, 1 gal	7	.2	60
Rubber, reclaimed	Bale	None	438	6.3	28
Do	do	do	412	2.0	10
Rubber scrap, n. o. s	do	do	1,268	20.0	31
Do	do	do	1,250	29.3	46
Do	do	do	1,103	19.7	36
Do	do	do	1,047	46.7	89
Do	do	do	582	20.0	69
Do	do	do	388	10.4	53
Do	Bag	do	140	2.3	34
Rubber scrap (hose)	Bundles	do	294	10.2	70
Do	do	do	128	3.8	60
Do	do	do	125	4.2	68
Do	do	do	108	4.5	86
Rum (Bacardi)	Fiber carton	12 bottles, 4/5 qt. each.	39	1.2	60
Rust preventive compound	Drum	None	495	10.7	43
Do	Wood box		81	1.7	45
Do	do		65	1.6	51
Salol	Wood barrel	None	225	9.5	84
Salt. (See Sodium chloride.)					
Santonin, crystals	Wood box		127	6.0	94
Sealing fluid, n. o. s.	Drum	None	500	13.0	51
Sealing wax. (See Wax, sealing.)					
Shock absorber fluid	Wood box		65	1.5	46
Shoe dressing, liquid	Wood barrel	None	491	12.3	50
Do	Wood box		225	7.2	64
Do	Wood keg	None	112	3.0	50
Do	Wood box		64	1.4	43
Shoe ink (dye)	do		65	1.0	30
Shoe wax	do		74	3.0	80
Do	do		62	2.0	59
Do	Drum	None	45	1.0	44
Sienna, burnt	Wood barrel	do	361	9.3	51
Sod oil (degras)	Drum	do	470	8.8	35
Soda ash	Bag	do	302	8.0	54
Do	do	do	251	4.0	31
Do	do	do	202	6.6	66
Do	do	do	201	5.8	57
Do	do	do	156	2.1	26
Do	do	do	101	2.1	40
Do	Wood box	Metal cans	125	4.0	61
Do	do		83	2.1	50
Soda ash, monohydrated	do	2 fiber drums, 100 lbs. each.	260	9.2	71
Do	Fiber carton	8 cans, 5 lbs. each	51	1.8	71
Sodium:					
Acetate	Drum	None	380	10.5	55
Do	Wood barrel	do	336	9.6	57
Alginate, dry	Drum	do	108	3.0	55
Benzoate	Wood barrel	do	122	7.0	111
Do	Drum	do	30	1.7	116
Bifluoride	Wood barrel	do	375	9.7	51
Do	do	do	272	5.1	37
Bisulfate (nitre cake)	Wood barrel, 47-gal	do	665	11.9	35
Bisulfite	Wood barrel	do	662	9.5	28
Do	do	do	625	11.9	38
Do	do	do	455	10.0	43
Do	do	do	342	6.1	35
Do	Carboy	do	215	6.9	64
Do	Wood box		125	3.0	48
Do	Drum	None	106	1.8	34
Bromide, technical	Wood barrel	do	525	10.0	38
Chloride (salt)	Wood box		116	3.0	53
Chromate	Wood cask	None	870	14.0	32

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Sodium—Continued.					
Cyanide	Drum	None	218	5.4	49
Fluoride	Wood barrel	do	400	9.7	48
Do	do	do	400	12.7	63
Fluoride, light	do	do	138	3.2	45
Fluoride, dense	do	do	397	6.7	33
Hydrosulfite	Drum	do	268	5.0	37
Do	do	do	268	4.2	31
Do	do	do	143	3.0	43
Do	do	do	121	3.6	59
Do	do	do	121	2.6	44
Metallic	Wood barrel	do	400	12.3	60
Do	Drum	do	406	11.0	54
Perborate (perborin)	Wood barrel	do	275	9.2	67
Do	Drum	do	250	7.6	60
Peroxide	Wood box		379	6.6	35
Do	do		377	12.2	64
Do	Fiber carton		313	6.5	41
Salicylate	Wood keg	None	119	6.0	91
Sulfide, solid	Drum, 50-gal.	do	663	9.0	27
Do	Drum	do	450	9.5	42
Do	do	do	403	9.1	45
Sulfide, flake	Drum, 50-gal	do	398	9.0	45
Do	Wood barrel	do	341	8.4	49
Sulfide, crystals	do	do	470	14.1	60
Sulfite	do	do	400	8.0	40
Do	do	do	421	7.8	37
Do	do	do	371	10.0	53
Do	do	do	349	7.2	42
Do	Wood keg	do	108	1.2	23
Do	Bag	do	202	3.9	46
Thiosulphate	Wood box	2 fiber drums, 100 gal. each.	260	9.2	70
Soybean oil	Wood barrel	None	460	13.1	57
Spearmint oil	Wood box		128	4.0	62
Stearine	Bag	None	202	3.9	39
Strontium carbonate	Wood barrel	do	282	9.6	69
Strontium nitrate	do	Paper liner	724	7.2	20
Sulfanilamide	Drum	None	118	5.0	85
Sulfapyridine	Wood box		101	5.0	99
Do	do		53	4.0	150
Sulfur black	Drum	None	385	11.4	59
Do	do	do	318	11.0	73
Do	do	do	167	6.7	79
Sulfur chloride	do	do	831	13.5	32
Sulfur doixide (compressed gas)	Cylinder	do	310	4.6	29
Do	do	do	219	4.0	36
Sulfate of potash	Wood box		75	3.3	88
Sulfur	Wood barrel	None	325	9.0	56
Do	Drum	do	110	2.7	48
Do	Bag	do	152	3.0	39
Do	do	do	101	1.5	30
Tallow	Wood tierce	do	470	12.1	51
Tanners' bate	Wood barrel	do	389	9.0	46
Do	Drum	do	60	1.7	56
Tanners' finishing compound	Wood barrel	do	597	12.0	40
Do	do	do	567	14.8	52
Do	do	do	538	13.5	54
Do	do	do	518	15.0	56
Do	do	do	504	15.0	58
Do	do	do	580	11.9	40
Tartar emetic (antimony potassium tartrate).	Wood box		25	1.0	79
Tear gas	do		21	1.0	95
Do	Drum	None	91.5	12.6	27
Tetraethyl lead mixture	Pail	do	65	2.3	70
Theobromine, pure (dimethyl xanthine).	Drum	do	409	11.6	57
Thinner, paint, n. o. s.	do	do	40	1.1	58
Do	Fiber carton	Cans	47	2.1	89
Do	Wood box	do	39	2.0	102
Do	Fiber drum	None	110	3.3	68
Thymol, crystals	do	do	29	1.2	80
Do	Drum, 55-gal	do	451	11.6	57 LT
Toluol (toluene)	Drum	do	701	11.0	31
Trichloroethylene	do	do	705	10.7	30
Do	Wood box		140	2.2	32
Do	Drum	None	576	10.6	37
Tri-cresyl phosphate	do	do	553	11.2	41
Tri-ethanolamine	do	do	561	11.0	39
Do	do	do	306	6.2	40
Do	do	do	442	10.7	48
Turpentine	do	do	432	11.1	51
Do					

CHEMICAL AND RELATED PRODUCTS—Continued

Product	Outer container	Inner container	Gross weight	Cubic feet	Stowage factor
Turpentine—Continued	Wood box	6 cans, 1 gal. each	59	1.8	60
Turpentine, wood	Drum	None	442	11.2	50
Do	Wood box		86	1.9	44
Do	do		70	1.5	45
Do	do		63	1.4	44
Turpentine, gum spirits of	Drum	None	402	11.4	58
Do	do	do	252	6.4	50
Do	Wood box		88	2.0	45
Vanillin	do		170	7.0	82
Vaseline petroleum jelly	Drum	None	444	11.6	53
Do	Wood box		200	6.5	70
Do	do		144	5.0	69
Do	do		131	4.5	71
Do	do		99	3.3	68
Do	do		87	3.1	72
Wax, sealing	Fiber carton		62	1.2	40
Whisky	Wood barrel	None	455	12.2	53
Do	do	do	425	9.0	50
Do	Wood box	Bottles	42	1.4	67
Do	Fiber carton	do	37	1.2	69
Wood pulp	Bale	None	223	7.7	69
Wool tops	do	do	414	25.9	125
Do	do	do	427	22.5	105
Xylol (xylene)	Drum	do	436	11.0	50
Zinc chloride	do	do	682	9.0	26
Do	Carboy	do	226	6.4	57
Zinc dust	Can	do	102	.6	12
Zinc oxide	Wood barrel	do	321	9.6	60
Do	do	do	278	9.6	69
Do	do	do	261	7.4	52
Do	do	do	246	7.4	59
Do	do	do	224	7.4	66
Do	Bag	do	102	1.6	31
Do	do	do	54	1.1	42
Do	do	do	51	.8	32
Do	do	do	133	3.3	53
Zinc stearate	Wood barrel	do	129	10.0	155
Do	Fiber carton		57	5.0	177
Zinc sulfate	Wood barrel	None	424	9.0	42
Do	do	do	324	9.0	55
Do	Bag	do	102	2.7	52

STOWAGE FACTORS OF GOODS CARRIED IN THE UNITED STATES INTERCOASTAL TRADE

The stowage factors of goods carried eastbound and westbound in the United States intercoastal trade are listed separately because of the fact that many commodities are packed for intercoastal shipment in a different manner than for export shipment. This means that a stowage factor of a commodity as packed for intercoastal shipment may differ considerably from the stowage factor of the same commodity as packed for export.

The following list is composed of stowage factors provided by one of the leading intercoastal steamship companies and of factors worked out from packing data furnished by a number of shippers. It should be noted that each stowage factor in the list is based on the short ton of 2,000 pounds, and, furthermore, includes an allowance for broken stowage and dunnage. To find the factor for a long ton, multiply by 2,240 and divide by 2,000.

While this list is applicable to United States intercoastal trade only, it also includes some Oriental and foreign commodities that are transferred from connecting carriers to intercoastal vessels.

It should be borne in mind that different methods of packing similar commodities by different manufacturers make exact estimates somewhat difficult, as the stowage factors vary in accordance with the different types of packing used. The list is valuable, however, as a general guide and is also of interest in that it gives a good indication of the commodities that move in the United States intercoastal trade.

Lumber.—Additional data on the stowage factors of Pacific coast lumber are contained in the section on Lumber in the chapter "Stowage of Special Cargoes."

The following stowage factors are based on short tons of 2,000 pounds and include estimated allowances for dunnage and broken stowage.

Stowage factors marked with an asterisk (*) are based on average weights and measurements of containers commonly used in the intercoastal trade.

STOWAGE FACTORS

[Tare weight, gross weight, and net weight shown in pounds]

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Acetone	Steel drum, ICC-5J	None	11.7	63	413	350	63
Do	do	do	12.0	60	410	350	66
Acetic anydride	Steel drum, ICC-5G	do	14.1	101	581	480	56
Acid:							
Boracic	Wood barrel	do					60
Do	Wood box						52
Butyric	do	None	14.1	101	531	430	60
Gamma	Wood barrel	do					100
Lactic	do	do					49
Tannic	Wood barrel, half	do					44
Tartaric	Wood barrel	do					60
N. o. s.	Steel drum	do					58
Albumen:							
Moist	Wood box	Tins					42
Dry	do	do					51
Alcohol:							
Butyl	Steel drum, ICC-5E	None	11.7	52	422	370	62
Denatured	Steel drum	do					63
Ethyl	Steel drum, ICC-5E	do	11.7	52	419	367	63
Grain	Wood barrel	do					80
Methyl	Steel drum, ICC-5E	do	11.7	52	410	358	64
Wood	Wood barrel	do					58/73
Do	Steel drum	do					67
N. o. s.	do	do					68
Alum, lump	Bag	do					87
Do	Wood barrel	do					63
Do	Basket	do					63
Alum, powdered	Wood barrel	do					54
Do	Wood box	do					48
Do	Wood cask	do					51
Ammonium sulfate	Bag	Packing material					52
Do	Wood box	do					52
Ammunition	do						23
Amyl acetate, technical	Steel drum, ICC-5E	None	11.7	52	442	390	59
Aniseed. (See Seeds.)							
Aniseed Oil. (See Oils.)							
Arsenic	Wood barrel	do					30
Do	Bag	do					36
Do	Wood box	do					23
Do	Wood keg	do					*28
Asbestos	Bag	do					63
Do	Wood box	do					72
Cement	Bag	do					70
Pipe covering	Wood box	do					*103
Do	Wood crate	do					*360

Sheeting	do	do					60
Shingles	Bundles	do					25
Babbitt, metal, ingots	Loose						20
Bags:							
Empty, uncompressed	Bundle	None					100
Paper	Paper wrapper	do	2.7	2	64	62	88
Do	Bundle	do					90
Bags and bagging	Bale	do					70
Baking powder	Wood box	Package					50
Do	Fiber carton	do					57
Balances	Wood box	Packing material	6.0	45	208	163	65
Barium peroxide	Steel drum	None					20
Bathing suits	Fiber carton						184
Bath tub, recess type	Wood crate	None	29.6	145	490	345	130
Batteries, flashlight	Wood box	do					45
Battery jars	do						85
Battery separators	do						130
Beans (see also Fodders and feeds for meal and cake):							
Cacao	Bag	None					*70
Do	do	do					65
Castor	do	do					*54
Lima	do	do					65
Red	do	do					48
Soya. (See also Soybeans.)	do	do					48
White, small	do	do					50
Beche-de-mer	Bale	do					125
Beds	Bundle	do					*350
Benzine	Steel drum	do					55
Beverages:							
Beer	Fiber carton	Bottles					58
Do	Wood cask	None					80
Do	Wood keg	do					78
Distilled spirits:							
Bitters, Angostura	Wood box	Bottles					38
Brandy	do	do					57
Do	Wood cask	None					80
Gin	Wood box	Bottles					57
Liquors	do	do					80
Do	Hogshead	None					70
Whisky	Wood box	Bottles					69
Do	Wood barrel	None					66
Ginger ale	Fiber carton	Bottles					42
Juice:							
Fruit	Wood barrel	Tins					44
Grape	do	None					44
Mineral waters	Wood box	Tins					52
Do	Steel drum	None					62
Wine	Wood barrel	do					56
Do	Wood box	Bottles					58
Biscuits	Fiber carton	Package					*100

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Bone:							
Ash	Wood cask	None					40
Black	Bag	do					56
Meal	do	do					42
Bones	do	do					82
Bones, crushed, dust	do	do					57
Books	Wood box	Paper liner					*54
Borax and borates:							
Crude	Bag	None					36
Powdered (boric acid)	Wood barrel	do					71
Do	Wood half barrel	do					65
Refined	Bag	do					49
Brass:							
Scrap	Wood barrel	do					*55
Do	Steel drum	do					*38
Sheet	Wood box						16
Do	Fiber carton						*16
Bristles	Wood box						64
Bronze	do	None					16
Bulbs, flower	Wood crate						70
Do	Bag	None					70
Butyl acetate	Steel drum, ICC-5E	do	11.7	52	447	395	59
Cabinets, metal	Wood crate	do					200
Cabinets, wood. (See Wood.)							
Cable, lead covered	Roll						*85
Cable, wire	Reels						35
Calcimine	Wood box	None					36
Do	Wood keg	do					53
Calcium:							
Chloride	Steel drum	do					43
Citrate	Wood barrel	do					148
Do	Bag	do					115
Camphor (Orient):							
½-ounce	Wood box	do					39
Powder	do	do					68
Slabs	do	do					54
Candles	Fiber carton	do					65
Candy	Wood box	Packages					60
Do	Wood barrel	None					*55
Do	do	do					*62
Chocolates	Fiber carton	Packages					*85
Canes, Malacca	Bale	None					105
Canned soup. (See Soup.)							
Cans, empty	Wood crate	do					155
Caps, bottle	Wood box	do					52

Carbide, calcium	Steel drum	do					40
Carbon dioxide	Cylinder	do					27
Carbon black	Wood box	do					125
Cards, playing	do	do					50
Cards, postal	do	do					40
Cartridges	do	Cardboard box					23
Casein	Bag	None					87
Caskets	Wood box	do					260
Castings, furnace	Loose						144
Caustic soda	Steel drum	None					30
Cellophane	Wood box	do					62
Do	Fiber carton	do					58
Cellosolve acetate	Steel drum	do	11.7	52	482	430	54
Celluloid or pyroxylin plastic	Fiber carton	do					63
Cellulose acetate	Fiber drum	do	8.3	22	147	125	126
Do	Corrugated fiber carton	do	5.4	10	1	100	108
Cement:							
Asbestos rock	Paper bag	do	2.8	1	51	50	125
High temperature refractory	Steel drum	do	4.6	22	272	250	38
Rubber	Wood box						50
Magnesia	Sack	None					*150
Shoe	Wood barrel	do					74
Portland	Sack	do					26
Do	Wood barrel	do					32
Cereals, breakfast food	Fiber carton	Packages					*80
Wheat, pearls of (breakfast food)	do	do					61
Certo. (See Pectin.)							
Chalk, unprepared	Wood barrel	None					45
Charcoal, animal	Bag	do					65
Chimney sweepings	Fiber carton						58
Do	Drum	None					42
Chimney sweepings, compressed	do	do					23
Chinaware, eggshell	Wood box	Packing material					250
Chinaware (Orient)	do	do					*72
Chlorasol	Steel drum, ICC-5E	None	11.7	53	643	590	41
Chloride of lime	Drum	do					68
Do	Wood box	Tins					60
Chocolate	Corrugated fiber carton	2 cardboard boxes	4.6	6	35	29	295
Coating	Wood box						45
Ground	do	Tins					60
Cinnabar	Bag	None					18
Citrate magnesia	Fiber carton	do					68
Citric acid	Wood barrel	do					67
Clay and clay products. (See also Bricks):							
Clay:							
China	do	do					42
Filtering	Bag	do					48
Fire	Wood barrel	do					*25
Do	Sack	do					*30
Do	Drum	do					*22
Filtering paper, clay	Bag	do					55
Fuller's earth (see also Earth)	do	do					73

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Clay and clay products—Continued							
Tile	Wood barrel	None					*70
Do	Wood box						40
Flat, wall	Wood crate	Corrugated cardboard	1.3	8	87	79	32
Floor	do	do	1.3	8	101	93	28
Trim, wall	do	do	1.3	8	65	57	44
Cleaning compound	Fiber carton	Bottles					56
Clothing, oiled	Wood box	None					85/120
Clorox	Fiber carton	Bottles					58
Cloverseed. (See Seeds.)							
Cocoa	Wood box						*65
Do	Drum						*90
Do	Wood barrel	Paper liner	10.0	23	208	185	108
Cocoa butter	Burlap bag	Paper lining	4.0	2	202	200	44
Coconut (see also Nuts):							
Copra (dried coconut)	Bag	None					*50
Iloilo	Bulk						75
Manila	do						72
Copra cake	Bag	None					63
Copra meal	do	do					*70
Desiccated	Wood box						70
Do	Fiber carton						85
Fiber. (See Fibers.)							
Oil. (See Oils.)							
Prepared	do	Tin can	.8	3.5	13.5	10	130
Do	do	do	2.0	5.5	30.5	25	145
Do	do	Cartons	.4	2	8	6	110
Do	do	do	.8	4	16	12	110
Do	Wood barrel	None	14.6	20	144	124	225
Coffee:							
Chaff	Bag	do					320
Green	do	do					*58
Roasted	Wood box	Tins					*85
Coke	Bulk						80
Copper:							
Ingots	Loose						10/13
Matte	Bag	None					18
Tubes	Loose						*40
Scrap	Steel drum	None					*45
Do	Wood barrel	do					*39
Copperas	Wood cask	do					50
Copra. (See Coconut.)							
Core compound. (See Rubber.)							
Cork	Bale	do					*325
Hard pressed	do	do					200
Shavings, granulated	Bag	do					265

Corn oil. (See Oils.)							
Cotton (see also under specific product):							
Manufactures:							
Household articles:							
Blankets	Wood box	Paper liner					160
Pillow cases	Plywood box	None	10.7	27	242	215	98
Sheets	do	do	16.7	38	488	450	73
Material:							
Bagging, rolls	Burlap	do	16.6	2	302	300	112
Do	do	do	22.8	2	402	400	114
Do	do	do	19.8	2	377	375	107
Broadcloth	Plywood box	do	30.8	60	690	630	98
Cheesecloth, bleached	Corrugated fiber carton	Paper lining	6.6	6	87	81	160
Cottonades	Cotton-covered bale	Cardboard	25.2	14	641	627	84
Denims	do	do	18.4	10	465	455	85
Flannel	Corrugated fiber carton	Wrapping paper	18.6	22	140	118	285
Do	Plywood box	None	60.0	84	399	315	325
Leather, artificial	Roll						45
Sheeting	Plywood box	None	17.9	40	490	450	78
Shirting, bleached	do	do	30.8	60	690	630	95
Piece goods:							
Piece goods	Bale	do					*63
Do	Wood box	Paper liner					61
Do	Bale	Water-proof paper	20.4	12	512	500	82
Do	Wood box	do	28.8	52	547	495	110
Remnants	Bale	do	20.4	12	512	500	82
Do	Wood box	do	28.8	52	547	495	110
Thread:							
Spool, cotton	Fiber carton						222
Do	Wood box						143
Wearing Apparel:							
Handkerchiefs	Corrugated fiber carton	Cardboard box	6.7	21	44	23	330
Pajamas	do	do	6.7	21	44	23	339
Shirts	do	do	6.7	21	43	23	330
Underwear	do	do	6.7	21	44	23	300
Raw:							
California, high density	Bale	None					*90
Domestic, dense (Eastern)	do	do					*117
Linters	do	do					172
Orient	do	do					*46
Semimanufactures:							
Tire fabric	do	do					180
Waste	do	do					160
Crabmeat	Wood box	Glass jars					50
Do	do	Tins					53
Crackers	Fiber carton	Package					*115
Cranberries	Bag	None					50
Crayons	Wood box						84
Cream of tartar	Wood barrel	None					*45
Do	do	do					*54
Do	Wood keg	do					*58

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight (pounds)	Gross weight (pounds)	Net weight (pounds)	Stowage factor
Creosote	Wood barrel	None					54
Do	Steel drum	do					58
Culverts, corrugated	Bundles						*70
Cups, paper drinking	Fiber carton						*240
Curios, Japan	Wood box						*150
Cuttlefish	do						135
Dairy products:							
Butter:[1]	do	Tins					*69
Fresh	do	None					78
Solid pack	Wood keg	do					56
Do	Wood box	do					48
Buttermilk	Wood barrel	do					80
Do	Bag	do					85
Cheese	Wood box						*55
Milk:							
Dry	Bag	Paper liner					87
Do	Wood box	Tins					46
Powdered	Wood barrel	None					*85
Powdered, skim	Metal drum	do	2.2	10	60	50	82
Do	Wood barrel	do	8.1	23	223	200	81
Powdered, whole	Corrugated fiber carton	12 1-lb. cans	.6	5	17	12	78
Do	Metal drum	None	2.2	16	66	50	75
Skim, dry	Bag	do					*45
Diacetone, A. F.	Steel drum, ICC-5E	do	11.7	52	477	425	55
Diacetone, technical	do	do	11.7	52	462	410	57
Dibutyl phthalate	do	do	11.7	52	532	480	50
Diethyl amino ethanol	do	do	11.7	52	442	390	50
Diethyl sulfate	do	do	11.7	52	582	530	45
Diethylene glycol	do	do	11.7	52	552	500	47
Drugs, herbs, leaves and roots:							
Aloes	Wood box	do					40
Do	Mat	do					46
Cascara bark	Bag	do					*175
Cinchona	Bale	do					125
Ginseng	Mat	do					110
Kola nuts. (See Nuts.)							
Licorice root	Bale	do					63
Pyrethrum, or insect flowers	do	do					*75
Sandalwood	do	do					105
Sandalwood, powder	Wood box						86
Senna	Bale	None					108

[1] 1 lb., 26 oz., 69 cu. ft.; 13 oz., 58 cu. ft.; 5 oz., 105 cu. ft.; 8 oz., 72 cu. ft.; 2 lbs., 58 cu. ft.; 5 lbs., 105 cu. ft.; 40 lbs., 77 cu. ft.

Drums, empty:							
100-gallon, steel	Loose						306
55-gallon, steel	do						265
50-gallon, iron	do						477
32-gallon, iron	do						405
Dyeing and tanning materials:							
Bark, tanning	Sack	None					90
Cutch	Bag	do					50
Gallnuts	Bale	do					86
Do	Sack	do					60
Gambier	Bale	do					90
Do	Mats	do					108
Tannic acid. (See Acid.)							
Tanning extract	Wood barrel	do					41
Do	Bag	do					33
Dyestuffs							*100
Dynamite	Wood box						45
Earth (see also Clay and clay products):							
Celite	Bag	None					160
Diatomite	do	do					110
Infusorial earth	do	do					160
Earthenware	Wood cask	Packing material					*125
Easter rabbits (novelties)	Fiber carton						1,100
Eggs:							
Dried	Wood box						67
Fresh	do	Fillers and cup flats	2.3	12.5	58.5	46	88
Frozen	Cylindrical tin cans	None	1.6	2	32	30	112
Whole	Wood box						90
Egg yolk, dried	do	Tins					62
Egg trays, paper	Fiber carton						248
Envelopes	Wood box						*115
Ethyl:							
Acetate	Steel drum, ICC-5E	None	11.7	52	447	395	59
Aceto acetate	do	do	11.7	53	503	450	52
Chloride	Drum	do					74
Ether	Steel drum, ICC-5J	do	12.0	60	370	310	73
Ketone	Steel drum	do					*58
Ethylene:							
Dibromide	do	do					*25
Dichloride	Steel drum, ICC-5E	do	11.7	53	613	560	43
Glycol	do	do	11.7	51	551	500	47
Do	Fiber carton						90
Extracts:							
Flavoring	do	Bottles					60
Malt	Wood barrel	None					72
Vanilla	Wood box						60
Feathers:							
Compressed (domestic)	Bale	None					75
Uncompressed (domestic)	do	do					337
Fertilizer and fertilizer materials:							
Fertilizer	Bag	None					74
Manure	do	do					74
Sheep, dry	do	do					74

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Fertilizer and fertilizer materials—Continued.							
Nitrate of soda	Bag	None					32
Superphosphates	Wood barrel	do					46
Do	Bag	do					38
Do	Bulk						30
Do	Wood keg	None					44
Tankage	Bag	do					58
Fibers and products:							
Raw:							
Coconut	Wood barrel	do					130
Flax	Bale	do					110
Do	do	do					*110
Hemp	do	do					*110
Hemp, high density	do	do					55
Jute, compressed (India)	do	do					46
Kapok	Bale	None					*150
Oakum, compressed	do	do					125
Ramie	do	do					80
Ramie, compressed	do	do					50
Sisal	do	do					110
Products:							
Burlap	do	do					58
Gunnies, domestic, compressed	do	do					48
Gunnies, Orient	do	do					55
Mattress fiber	do	do					85
Rope, new, manila	Coil						*107
Rope, scrap	Bale						*80
Films, scrap, motion picture	Wood box						48
Filtral	Wood barrel	None					42
Do	Bag	do					48
Firecrackers	Wood box						86
Fire extinguishers	Fiber carton						55
Fireplugs	Loose						30
Fish except shellfish:							
Cod blocks	Wood box						*46
Cod, strips	do	Tins					55
Cod strips, dried	do						*64
Fresh	do						75
Herrings, salt	Wood barrel	None					45
Oil. (See Oil.)							
Salmon, canned	Wood box	Tins					50
Sardines, tinned, small	do	do					45
Sardines, tinned, large	do	do					48
Fixtures, showcase	Wood crate	None					230
Fixtures, built in	do	do					185

Flaxseed. (See Linseed under Seeds.)							
Floor covering:							
Asphalt	Steel drum	do					45
Carpets, wool, etc	Bale	do					*163
Do	Wood box	do					*135
Do	Rolls	do					*130
Carpets, wool (China)	do	do					*170
Carpet lining	Bale	do					160
Cott-a-lapp (Floor covering) 5-in	Tubes	do					102
Cott-a-lapp, 6-in	do	do					110
Linoleum	do	do					*105
Do	Wood crate	do					*85
Do	Roll						*60
Do	Wood crate	None					*85
Rugs, woolen	Wood box						135
Do	Bale	None					163
Do	Roll	do					130
Flowers, dried	Fiber carton						825
Flower bulbs. (See Bulbs.)							
Fodders and feeds:							
Beet pulp	Bag	None					120
Do	do	do					155
Bran	do	do					120
Peanut	do	do					50
Cake:							
Bean	Bale	do					36
Cottonseed	do	do					48
Linseed	Bag	do					47
Dog biscuits	Fiber carton						120
Feed	Bag	None					55
Feed, mixed livestock and poultry	do	do		1	101	100	58
Hay:							
Alfalfa	Bale	do					*188
Oaten	do	do					*214
Government compressed	do	do					81
Meal:							
Alfalfa	Bag	do					96
Bean, Orient	Wood box						47
Cottonseed	Bag	None					60
Peanut Cake	do	do					250
Soybean	do	do					75
Formaldehyde	Wood barrel	do					55
Do	Metal drum	do					50
Fruits:							
Canned:							
Dry	Fiber carton	Tins					54
Pineapple	Wood box						*50
Do	Fiber carton						*45
Dried:							
Apples, compressed	Wood box	None					65
Apricots, compressed	do	do					46
Do	Bag	do					50
Currants, tight pack	Wood box						46

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Fruits—Continued.							
Dried—Continued.							
Dates	Wood Box						42
Figs	do						45
Prunes	Bag	None					54
Do	Wood box	do					48
Raisins	Fiber carton	Packets					*55
Loose	Wood box						56
Seedless	do						44
N. o. s	do						54
Fresh:							
Apples	Wood barrel	None					90
Do	Wood box	do					75
Berries. (See under specific name.)							
Casabas	Wood crate	do					80
Grapes	Wood barrel	do					65
Do	Wood keg	do					115
Do	Wood box	do					73
Do	Lug, 22 lbs						85
Do	Lug, 32 lbs						95
Lemons	Wood crate	None					90
Do	Wood box	do					77
Melons, honeydew	Wood crate	do					80
Nectarines	Lug	do					109
Oranges	Wood box	do					72
Do	do	do					75
Peaches	Lug	do					64
Pears	Wood box	do					66
Do	Lug	do					76
Plums	do	do					109
Prepared and preserved:							
Cherries (in brine)	Wood barrel	None					58
Orange-juice pulp	do	do					44
Do	Fiber carton	Glass jars					55
Furniture, steel	Wood crate	None					*282
Gallnuts. (See Dyeing and tanning materials.)							
Gasolene. (See Petroleum products.)							
Gelatin	Wood barrel	do					72
Glass and glass products:							
Bottles, empty	Fiber carton	Separators					*115
Do	Wood crate	do					*90
Broken	Sack						*43
Do	Bulk						35
Carboys, empty	Loose						239
Chimneys, lamp	Wood box	Separators					200

Electric-light bulbs	Fiber carton						300
Complete	do	None					165
Incomplete	do						210
Glassware	do						*150
Glassware, table:							
Cups, 4 doz	Corrugated fiber carton	Corrugated fiberboard	1.5	7	25	18	130
Cups, 6 doz	do	do	2.0	7.5	30	22.5	145
Plates, 2 doz	do	do	.9	5	29	24	68
Do	do	do	.8	5	25	20	70
Saucers, 6 doz	do	do	.7	5	28	23	54
Saucers, 4 doz	do	do	.6	3	19	16	68
Tumblers, 9 oz., 12 doz	do	do	3.5	11	58	47	130
Mirrors	Wood box						*75
Window glass	do						52
Do	do	None					*52
Glue:							
Ordinary, broken	Bag	do					60
Flake, dry	do	do					160
Powdered	Wood cask	do					105
Glycerin	Metal drum	do					50
Grains and preparations (see also specific products):							
Barley	Bag	do					54
Do	Bulk	do					*48
Barley, pearl	Wood box	Packages					50
Corn	Bag	None					50
Flour	do	do	3.0	1	141	140	53
Flour	Wood barrel	None					56
Do	Bag	do					50
Do	Sack	do					50
Do	Wood box	Tins					78
Grit, baker's	Bag	None					235
Grits, coarse, grain	do	do					52
Maize	do	do					50
Malt	do	do					80
Oats:							
Clipped	do	do					67
Unclipped	do	do					75
Rice:							
Broken	do	do					49
Domestic, clean	do	do					45
Dust	do	do					58
Meal	do	do					60
Orient, clean	do	do					46
Paddy	do	do					65
Rye	do	do					52
Wheat	do	do					*45
Do	do	do					47
Do	Bulk	do					43
Do	do						41
Cracked	Bag	None					50
Do	do	do					48
Flakes	Fiber carton	Packages					240

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Granite, large, dressed	Blocks						17
Graphite	Wood keg	None					44
Grave vaults	Paper wrapper	do					*325
Greases	Wood barrel	do					*52
Gums, resins, and balsams:							
Chewing	Wood box	Card-board boxes					60
Copal	do						72
Do	Bag	None					76
Kauri	do	do					63
Do	Wood box						57
Pitch	Wood barrel	None					*45
Lignin	Burlap bag	Paper liner	4.8	1.5	131.5	130	80
Resin	Wood barrel						55
Rosin	Steel drum	None	10.4	17	532	515	44
Tar:							
Pine	Wood barrel	do					51
Coal	do	do					45
Turpentine	Wood box	Tins					50
Do	Wood barrel	None					65
Do	Steel drum	do	11.4	52	444	392	60
Gypsum	Bag	do					41
Hair, animal:							
Cattle, compressed	Bale	do					89
Hog	do	do					175
Horse, compressed	do	do					*80
Hair, human	do	do					135
Handkerchiefs. (See Cotton, etc.)							
Hangers, coat	Fiber carton						200
Hardware and tools (see also specific name):							
Aluminum ware	Wood box	Packing material					*243
Bolts, nuts, rivets	Wood keg	None					40
Do	Wood box	do					29
Brushes, paint	do						105
Hammers, hand	do	Wax paper liner	5.5	25	250	225	48
Hardware, iron, n. o. s.	do	do	2.8	14	170	156	36
Nails	Wood keg	None					39
Boat, galvanized	do	do					37
Pliers, steel	Wood box	Cardboard	2.9	20	167	147	38
Sash, metal	Loose						100
Tacks, iron	Wood box						24
Tinware (tubs, pails)	Nested						120
Tinware (utensils)	Wood box						179
Tools, mechanic's hand	do	Wax paper liner	2.3	12	196	184	25
Wrenches, steel	do	Cardboard	2.9	20	167	147	36
Hats. (See Rush hats.)							

Hempseed. (See Seeds.)							
Hides:							
Dry, large	Bale	None					200
Dry, pressed	do	do					80
Wet	Wood barrel	do					50
Wet, green, salt	Bundle						44
Horns	Bulk						*100
Do	Bag	None					*100
Horse collars, leather	Corrugated fiber carton	do	7.2	5	50	45	320
Hosiery	Fiber carton						100
Hyposulphite soda	Wood keg						52
Hypro	Fiber carton						58
Hytempite	Wood barrel	None					*35
Do	Metal drum	do					33
Ice cans	Loose						134
Ice-cream cones	Fiber carton						100
Ice-cream freezers	Wood crate	None					220
Ink:							
Printing	Steel drum	do					50
Writing	Wood box	Bottles					54
Insulating tape	Fiber carton						111
Insulators	Wood box						79
Iron:							
Corrugated sheets	Nested						13
Rails, railway	Loose						13
Sheets	Bundle						10
Iron oxide	Wood barrel	None					25
Iron or steel, bars	Pieces						12
Isopropyl acetate	Steel drum, ICC-5E	None	11.7	52	432	380	60
Jams and jellies	Wood barrel	do					42
Do	Wood box	Tins					52
Do	do	Bottles					56
Jello	Fiber carton	Packages					76
Junk. (See Commodity.)							
Kalsomine. (See Calsomine.)							
Kerosene. (See Petroleum products.)							
Ketchup. (See Vegetables, prepared and preserved.)							
Labels, gummed	Wood box						54
Do	Fiber carton						55
Do	Roll						48
Lactein	Wood barrel	None					54
Lampblack	Bag	do					110
Do	Wood barrel	do					125
Lanterns, oil	Wood box						170
Lath, metal	Sheets						100
Lath, wood. (See Wood.)							
Lead:							
Black	Wood keg	None					44
Foil	Fiber carton						42
Pig	Pigs						9
Sheet	Roll						17
Do	Wood box						20

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Leather (see also Hides, Skins, and specific products):							
Artificial (listed under Cotton).							
Belting butts	Bale	None	4.1	3	178	175	52
Compressed	do	do					64
Flat	Wood box						60
Harness	Corrugated fiber carton	None	4.2	6	50	44	186
Small	Bale	do					136
Sole leather, bends	do	do	7.1	1	325	324	48
Tanned	Roll						130
Taps	Corrugated fiber carton	None	1.5	2.5	70	67.5	48
Lime:							
Acetate	Bag	do					90
Chloride	Steel drum	do					68
Do	Wood box	Tins					60
Hydrated	Bag	None					45
Linseed. (See Seeds.)							
Linseed oil. (See Oils.)							
Lubricating oil. (See Petroleum products.)							
Luggage:							
Bags, traveling	Fiber carton	do					*300
Trunks	Paper wrapper	do					400
Lye and cleanser	Fiber carton	Tins					50
Macaroni	do						105
Machinery and parts:							
Agricultural:							
Harrows, disk	Wood box	None					*69
Implements	Loose						120
Tractors, caterpillar	Wood box						*84
Electrical:							
Arc welders, portable	do	None	17.2	137	774	637	49
Do	do	do	8.5	81	408	327	47
Electrodes, welding	Solid fiber carton	do	.3	2	52	50	13
Irons	Fiber cartons						70
Refrigerators	Wood crate	None					*140
Refrigerator parts:							
Compressors	Wood box						115
Coils	do						130
Motors	do						58
Metal cabinets	do						*150
Engines:							
Diesel, marine	do	None	84.7	938	3,930	2,992	46
Diesel, union	do						54

Gas	Skids						55
Gas transformers, oil well	Wood box						125
Miscellaneous:							
Adding machines	do	Packing material					95
Boilers, range	Pieces						*175
Brake lining	Bale	None					48
Cash registers	Wood box	Packing material					70
Cutting machine	Wood crate	None	93.0	250	3,000	2,750	69
Do	do	do	147.1	400	3,500	3,100	94
Cylinders:							
Medium, empty	Loose						54
Large, empty	do						73
Small, empty	do						60
Elevators:							
Portable	Wood crate	None					310
Controller	Wood box	do	51.5	250	930	680	120
Generator	Wood crate	do	13.4	80	1,010	930	28
Machine	do	do	91.7	415	3,240	2,825	62
Linotypes	Wood box						105
Meters, water	do						45
Sewing machines	Wood crate						*250
Knocked-down	do						*100
Magnesia, insulating material	Wood box						225
Magnesium carbonate	Bag	None					216
Magnesite	do	do					55
Broken	Bulk						35
Calcined	do						20
Mail, postal, U. S. and foreign	Bag						80
Do	Pouch						80
Do	Basket						80
Marble	Blocks						16
Do	Slabs						20
Do	Wood crate	None					22
Marble dust	Wood barrel	do					32
Matting:							
Compressed	Bale	do					*100
Orient	do	do					*200
Matzos	Fiber carton						115
Meat and meat products:							
Bacon	do	Glass jars					*68
Beef, corned	do	Tins					42
Do	Half wood box	do					*44
Casings, hog	Wood barrel	None					55
Ham, deviled	Fiber carton	Tins					64
Meat scrap	Bag	None					55
Middlings	do	do					55
Lard	Wood box						53
Do	Wood cask	None					58
Do	Tub	do					66

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Medicinal and pharmaceutical products:							
Aspirin	Wood box						56
Bromo seltzer	Fiber carton	Bottles, separators					120
Dressings, surgical	do						125
Drugs	do						*70
Epson salts	do						56
Do	Wood barrel	None					55
Do	Wood keg	do					58
Kotex	Fiber carbon	Packages					235
Menthol crystals (Orient)	Wood box						64
Modess	Fiber carton	Cardboard boxes					235
Suppositories	Wood box						85
Wine tonic	do	Bottles					58
Melba toast	Fiber carton						265
Metal:							
Scrap	Bag	None					*40
Polish	Wood box	Tins					60
Metals. (See specific name.)							
Metal articles. (See Hardware.)							
Methanol	Steel drum, ICC-5E	None	11.7	52	410	358	63
Methyl acetone	Steel drum, ICC-5J	do	12.0	60	429	369	63
Methyl isobutyl ketone	Steel drum, ICC-5E	do	11.7	52	402	350	65
Methylamines	do	do	11.7	52	452	400	57
Mica	Bale	do					100
Do	Wood barrel	do					55
Mohair. (See Wool-type hair.)							
Monoethanolamine	Steel drum, ICC-5E	do	11.7	52	512	460	51
Mop wringers	Wood crate	do					280
Mortar	Metal drum	do					33
Do	Wood barrel	do					35
Dry	Bag	do					38
Wet	do	do					34
Nickel:							
Cathodes, slabs	Wood barrel	do	10.4	60	910	850	26
Do	Wood keg	do	5.6	35	575	540	22
Do	do	do	3.3	27	417	390	18
Ingots	Loose						11
Do	Wood keg	None	3.3	27	467	4[illegible]0	16
Do	do	do	5.6	35	735	700	17
Do	Wood barrel	do	10.4	60	1,410	1,350	16
Ore	Bag	do					18
Do	Wood barrel	do					22
Oxide	Wood keg	do	5.6	35	435	400	29
Do	Wood barrel	do	10.4	60	860	800	27

Shot	Wood keg	do	3.3	27	477	450	15
Do	Wood box	do	.1	2.5	27.5	25	8
Do	do	do	.2	4	54	50	8
Do	do	do	.3	6	106	100	6
Nitrocellulose, wet (collodion cotton)	Steel barrel	do	11.0	90	336	246	73
Nuts. (See under specific name for products):							
Almonds:							
Domestic, shelled	Bag	do					68
Do	Wood box	do					63
Domestic:							
Roasted	Drum	do					73
Unshelled	Bag	do					115
Orient, shelled	Wood box	do					66
Brazil	Bag	do					84
Chestnuts (China)	do	do					175
Do	Wood box						110
Coconuts	Bag	None					90
Do	Wood barrel	do					62
Gallnuts. (See Dyeing and tanning materials.)							
Peanuts:							
Shelled	Bag	do					60
Unshelled	do	do					152
Walnuts:							
Shelled	Wood box						70
Unshelled	Bag	None					95
Walnut meat	Wood box						81
Oils:							
Aniseed	do	Tins					48
Bean	Wood barrel	None					57
Do	Bulk						36
Do	Wood box	Tins					48
Camphor	Steel drum	None					63
Castor	Wood barrel	do					55
Chinawood (Orient)	do	do					58
Do	Bulk	do					43
Do	Wood box	Tins					52
Citronella (Orient)	Steel drum	None					30
Citrus	Wood box						50
Do	Steel drum	None					56
Coconut	Bulk						35
Do	Wood cask	None					59
Do	Steel drum	do					55
Codliver	Wood barrel	do			275		63
Do	do	do			230		64
Do	do	do			450		54
Corn	Fiber carton	Tins					60
Cottonseed	Wood barrel	None					65
Do	Steel drum	do					59
Do	Fiber carton	Glass containers					60
Fish	Drum						50
Linseed (flaxseed)	Wood barrel	None					57
Do	Steel drum	do					52

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Oils—Continued							
Lubricating. (See under specific name.)							
Mace	Wood box						60
Do	Flask						52
Olive	Wood box	Tins					40
Do	Wood barrel	None					55
Palm	do	do					55
Peanut	Bulk						44
Pine	Steel drum	None	11.4	52	477	425	53
Rapeseed	Wood barrel	do					58
Red	do	do					62
Soybean	do	do					57
Do	Wood box	Tins					50
Sperm	Bulk						36
Do	Wood tierce						56
Do	Hogshead						56
Tung. (See Chinawood oil.)							
Wood	Wood barrel	None					38
Oilcoth	Wood crate	do					85
Do	Tubes	do					105
Do	Rolls	do					60
Oil stove. (See Stoves.)							
Olives. (See Vegetables.)							
Onyx, rough	Blocks						21
Onyx ornaments	Wood box						*40
Orange juice pulp. (See Fruits.)							
Ore:							
Antimony	Bag	None					20
Fine	Wood box						14
Bulk	Loose						17
Aluminum:							
Bauxite	Bag	None					40
Halvans	Wood box						50
Manganese	Bag	None					22
Molybdenum	Sack	do					20
Pabcolin	Wood crate	do					73
Tungsten	Sack	do					20
Paints and varnishes:							
Paint:							
Dry	Wood barrel	do					*95
Liquid, n. o. s	Wood box	Tins					36
Do	Metal drum	None					45
Varnish	Wood barrel	do					*56
Do	Wood box	Tins					*52
Paint oil (Hydrocarbon)	do						53

Paper (see also Pulp board):							
Cleansing tissues	Corrugated fiber carton	Paper boxes	5.3	11	52	41	229
Crepe	Wood box						149
Flat	do						*41
Magazine	Bale	None					*60
Magazines, scrap	do						*60
Newsprint	Roll	None					75
Newspapers, old	Bale	do					*66
Rice	Wood box						75
Rolls, large, n. o. s	Roll						80
Roofing	do	None					50
Toilet	Fiber carton	do					*160
Do	Corrugated fiber carton	do	5.6	8	68	60	180
Wallpaper	Bundle	do					120
Waxed	Fiber carton	Packages					212
Flat, heavy	Bundle	None					45
Wrapping	Roll						53
Kraft	Paper wrapper	None	9.6	3	200	197	106
Paper base stocks:							
Wood pulp	Roll						*65
Pulp: Wet	Bale	None					50
N. o. s	do	do					62
Papeterie and envelopes	Wood box						148
Peanut. (See Nuts.)							
Pectin, fruit	do						50
Certo	Fiber carton	Bottles					53
Do	Wood box	Tins					48
Pencil slats	Bag	None					105
Petroleum products:							
Asphalt	Steel drum	do					48
Do	Wood barrel	do					*60
Gasoline	Wood box	Tins					57
Do	Steel drum, 110-gal	None					61
Do	Steel drum, 50-gal	do					66
Kerosene	Wood box	Tins					*51
Do	Steel drum	None					56
Lubricating oil	Wood barrel	do					*57
Do	Wood box	Tins					*47
Do	Steel drum	None					*55
Pianos	Wood box	do					*177
Pigments:							
Barytes	Sack	do					36
Lead:							
Dry red	Pail	do					27
White	Wood keg						27
Lithopone	Bag	None					*65
Do	Wood barrel	do					*52
Pipe:							
Conduit	Bundle						*30
Covering	Wood crate						*360
Fittings	Bag	None					*30
Do	Wood barrel	do					*48

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Pipe—Continued							
Oilwell:							
Up to 6 in	Pieces						40
Up to 7 in	do						50
Up to 10 in	do						60
Up to 13 in	do						70
N. o. s.	Bundle						*28
Plaster	Bag	None					*40
Plaster board	Fiber carton	do					65
Potash	Sack	do					50
Potash, bichromate of	Wood cask	do	14.0	70	870	800	36
Do	Wood barrel	do	7.8	20	500	480	35
Propylene glycol	Steel drum, ICC-5E	do	11.7	51	551	500	47
Pulp board:							
Wallboard	Wood crate	do					65
Beaver board	do	do					65
Do	Loose						60
Pulpboard, n. o. s.	Roll	None					80
Do	Wood crate						65
Do	Loose						60
Do	Paper wrapper	None	27.0	3	710	707	85
Pumice stone	Bag	do					68
Putty	Wood barrel	do					36
Pyroflax	Cylinder	do					35
Pyroxylin cloth	Wood box	do					46
Quicksilver	Flask	do					5
Radiators:							
Automobile. (See Vehicles and parts.)							
Heat castings	Pieces						40
Radio horns	Fiber carton						560
Rags:							
Domestic:							
Medium	Bale	None					120
Large	do	do					165
Compressed	do	do					70
Orient, compressed	do	do					64
Rail iron:							
Rails	Pieces						12
Ties	Bundle						20
Tires	Pieces						42
Ranges, gas, electric	Wood crate	None					*135
Rapeseed. (See Seeds.)							
Rapeseed cake	Bag	do					50
Rapeseed oil. (See Oils.)							
Record compound	Wood box	do					60

Records:							
Phonograph	do	do					60
Scrap, phonograph	do						44
Reels, cable, empty	Loose						*300
Refractory brick or clay (see also Clay):							
Bricks	Bulk						19
Chrome	Wood crate	None	3.8	43	359	316	24
Do	Wood skid	do	34.4	250	3,979	3,729	19
Clay	Wood crate	do	4.9	34	286	252	38
Magnesite	do	do	3.8	38	318	280	27
Do	Wood skid	do	37.5	255	3,915	3,660	22
Silica	Wood crate	do	6.1	54	373	319	37
Fire clay	Cloth bag	do	1.6	3	103	100	32
Fire clay or bricks	Drum	do					22
Do	Bag	do					30
Do	Bulk	do					24
Do	Skids						29
Refrigerated cargo:							
Apples	Wood box						77
Artichokes	Wood crate						95
Asparagus	Wood box						97
Beets	Wood crate						70
Brussel sprouts	do						108
Butter	Wood box						78
Cabbage	Wood crate						102
Carrots	do						70
Casabas	do						80
Celery	do						245
Do	Half wood crate						315
Grapes	Wood keg						115
Do	Wood box						73
Grapes (22#)	Lug						85
Grapes (32#)	do						95
Grapefruit	Wood box						80
Honeydew melons	Wood crate						80
Lemons	Wood box						77
Do	Wood crate						90
Lettuce	do						187
Nectarines	Lug						109
Onions	Wood crate						68
Oranges	Wood box						*73
Peaches	Lug						64
Pears	Wood box						66
Do	Lug						76
Plums	do						109
Potatoes	Wood crate						63
Turnips	do						70
Rock wool	Corrugated fiber carton	None	6.0	3.5	33.5	30	390
Do	Paper bag	do	2.9	1	31	30	200
Do	do	do	2.9	1	36	35	170
Rock wool, mineral, metal reinforced	Wirebound, wood crate	Corrugated fiber-board	20	67	40	333	102
Rock wool, plain	Paper bag	None	3.8	1	36	35	230
Roofing, felt	Rolls						48

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Rubber, allied gums, and manufactures:							
Unmanufactured:							
Chlorinated	Fiber drum	None	8.3	20	120	100	155
Do	Fiber carton	do	4.6	10	110	100	90
Jelatong	Wood box	do					68
Lastex	do	Tins					48
Crepe	do	None					62
Raw	Bag	do					58
Do	Bale	do					*58
Smoked	Wood box	do					48
Manufactured:							
Belting	Bale	do					46
Core compound	Bag	do					55
Heels	Fiber carton						53
Hose, garden	Bale	None					90
Do	Wood box	do					70
Scrap	Bag	do					106
Scrap, tight	Bale	do					70
Shoes	Wood box						187
Tire fabric	Roll						70
Tires:							
Pneumatic	Loose						*250
Scrap	do						175
Do	Bale						100
Do	Loose						190
Rubber goods, n. o. s.	Wood box						*90
Rush, hats (oriental)	do	None					177
Saccharin	do						72
Salt	Bag	None					35
Do	Wood barrel	do					44
Do	Bulk						32
Do	Wood box						41
Do	do	Bottles					50
Salt cake	Wood barrel	None					55
Sand, glass	Bulk						*19
Scales	Wood box						*65
Do	do	Packing material	6.0	45	208	163	65
Scouring compounds	Fiber carton						53
Seeds:							
Anise	Bag	None					108
Apricot kernels	do	do					60
Canary	Drum	do					52
Caraway	Bag	do					54
Celery	do	do					68
Clover	do	do					45

Cummin	do	do					110
Flax. (See Linseed.)							
Grass, rye	do	do					76
Hemp	do	do					64
Linseed	do	do					55
Do	do	do					54
Millet (Orient)	do	do					65
Mustard	do	do					58
Rape (Orient)	do	do					70
Sesame	do	do					73
Sunflower	do	do					105
Tapioca	do	do					*37
Vetch	do	do					46
Sheep dip	Metal drum	do					53
Sheet rock	Loose						50
Shells:							
Mother-of-pearl	Bag	None					68
Do	Wood box						55
Do	do						44
Oyster	Sack	None					60
Crushed	do	do					58
Shoes:							
Boys'	Solid fiber carton	Cardboard boxes	2.3	8	28	20	180
Children's	do	do	3.4	9	36	27	200
Infants'	do	do	2.3	6	20	14	245
Men's	do	do	2.8	9	35	26	170
Misses'	do	do	4.3	14	52	38	175
Women's	do	do	5.7	19	60	41	205
Youths'	do	do	2.3	6	24	18	210
Shoes and boots:							
Canvas	Wood box						120
Leather	do						*140
Do	Fiber carton						*220
Shrimp, domestic	Wood barrel	None					*100
Silk:							
Noils	Bale	do					64
Raw (Orient)	do	do					97
Waste	do	do					135
Compressed	do	do					55
In the piece	Wood box						*110
Skins:							
Dog (Orient)	Bale	None					*163
Dry	do	do					163
Goat (Orient)	do	do					*92
Dry	do	do					92
Rabbit, dry	do	do					150
Sheep:							
Dry, wool on	do	do					325
Slats, wet	Bundle	do					48
Do	do	do					56
Slate	Blocks						26
Ground	Bag	None					28
Pencils	Wood box						60

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Soap and toilet preparations:							
Cosmetics	Wood box						*85
Hair preparations:							
Glo-co (hair tonic)	Fiber carton	Bottles					75
Hair rinse	Wood box	do					54
Hair waving compound	do	do					53
Soap:							
Common	do						50
Flakes	Fiber carton						*100
Powder	Wood box						75
Solid pack	Wood barrel	None					57
Tar	Fiber carton						50
Toilet	Wood box						55
Toilet preparations	Fiber carton						*75
Soda:							
Bicarbonate (baking soda)	Wood barrel	None					44
Bichromate of	Wood cask	do	14.0	70	750	680	42
Do	Wood barrel	do	7.8	20	400	380	44
Caustic (hydroxide)	Metal drum	do					26
Sal (washing soda)	Fiber carton	do					40
Silicate (water glass)	Wood box	Tins					40
Soda ash (carbonate calcined)	Wood barrel	None					48
Dense	Bag	do					44
Light	do	do					58
Solder, dross	Wood barrel	do					17
Do	do	do					16
Soot	Fiber carton						58
Do	Metal drum	None					42
Soup, canned	Wood box	Cans					52
Soy. (See Vegetables.)							
Soybean oil. (See Oils.)							
Soybeans	Bag	None					48
Spaghetti	do						108
Spelter, ingots. (See Zinc.)							
Sperm oil. (See Oils.)							
Spices (see also Seeds)	Fiber carton	144 2-oz. tins	1.1	19	37	18	63
Capsicums	Sack	None					150
Cardamoms	Wood box	do					86
Cassia	Bale	do					104
Chilies, dry	Bag	do					*140/183
Cinnamon, quills	Bale	do					115
Do	Wood box						90
Cloves	Chests						100
Ginger	Bag	None					*63
Mace	Wood box						85
Mustard	Fiber carton						65

Nutmegs	Wood box						56
Paprika	Bag	None					70
Pepper	do	do					85
Pimentos	do	do					120
Sponges, compressed	Bale	do					160
Squid, dry	do	do					60
Steel:							
Band, tight	Bundle						12
Bars	Pieces						*12
Billets	do						10
Plates	do						*10
Pigs	Loose						11
Structural:							
I beams	Pieces						*24
Channels	do						21
Angles	do						13
Stoves:							
Gas, set-up	Wood crate	None					*300
Oil	do	do					*135
Strawbraid	Bale	do					200
Orient	Wood box						98
Strawplait	do						170
Sulfur, crude	Wood barrel	None					43
Do	Bag	do					35
Sulfur, flowers of	Wood barrel	do					57
Sugar and related products (see also under specific name):							
Candy. (See Candy.)							
Glucose	do	do	13.7	60	760	700	45
Do	do	do					44
Honey	Wood box	2 5-gal. tins					35
Do	do	Glass jars					52
Lactose (sugar of milk)	Wood barrel	None					73
Do	do	do					66
Molasses	do	do					42
Sugar:							
Dry	Bag	do					44
Dry (Philippines)	do	do					42
Raw	do	do					40
Do	Mat	do					38
Sugar, corn	Fiber carton	Packages					50
Sugar cane	Wood box						48
Syrup (see also Sugar and related products):							
Corn	Steel drum	None					60
Fruit	Wood barrel	do					40
Do	Wood box	2 5-gal. tins					35
Maple	Fiber carton	Tins					54
Raisin	Wood barrel	None					41
Do	Wood box	2 5-gal. tins					35
Do	Wood barrel	None					41
Talc	Bag	do					43
Tallow	Wood barrel	do					60
Do	Metal drum	do					54
Tanks, empty soda	Loose						115

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Tannic acid. (See Acid.)							
Tartanic acid. (See Acid.)							
Tea, China	Chest						*125
Domestic pack	Drum						164
Tin:							
Ingots	Loose						9
Foil	Bundle						22
Do	Fiber carton						42
Plate	Wood box						10
Plate, scrap, compressed	Bale	None					37
Oxide	Wood barrel	do					46
Tires:							
Rubber. (See Rubber.)							
Solid, steel rims	Loose						*65
Tobacco and manufactures:							
Cigarettes	Fiber carton	Packages					*100
Cigars	Wood box	Boxes					156
Leaf	Hogshead						*130
Plug	Wood box						45
Smoking	do	Packages					150
Turkish	Bale						140
Toys	Wood box						*285
Trichlorethylene	Steel drum, ICC-5E	None	11.7	53	703	650	37
Triethanolamine	do	do	11.7	52	562	510	47
Trisoda phosphate	Wood barrel	do					62
Vacuum bottles	Wood box						135
Valves	Wood crate						*18
Do	Wood barrel	None					*40
Do	Loose						*20
Vegetables:							
Canned:							
Asparagus	Fiber carton	Tins					*48
Dried:							
Onions	Wood crate	None					67
Do	Bag	do					75
Peas	do	do					50
Fresh:							
Artichokes	Wood crate	do					95
Asparagus	Wood box	do					97
Beets	Wood crate	do					95
Brussels sprouts	do	do					108
Cabbage	do	do					120
Carrots	do	do					70
Celery	do	do					245
Do	Half wood crate	do					315

Garlic	Bag	do					88
Lettuce	Wood crate	do					187
Potatoes	Sack	do					58
Turnips	Wood crate	do					70
Prepared and preserved:							
Catsup (see also Ketchup)	Wood box	Bottles					85
Cauliflower (in preservative)	Wood barrel	None					58
Ketchup	Wood box	Small bottles					51
Do	do	Large bottles					55
Olives	Wood barrel	None					*70
Do	Fiber carton	Bottles					80
Pickles	Wood box	Glass jars					65
Do	Wood barrel	None					61
Do	Wood keg	do					58
Soy	Wood box	Cans					66
Do	Kit						98
Vinegar	Wood barrel	None					60
Do	Wood box	Glass bottles					72
Worcestershire sauce (Lea & Perrins sauce)	do	Bottles					75
Vegetable products, miscellaneous:							
Agar-agar, not compressed (domestic)	Bag	None					640
Agar-agar, compressed (Japan)	Bale	do					54
Arrowroot	Bag	do					48
Do	Wood box	Packages					63
Hops, domestic	Bale	None					*225
Do	Fiber carton	Packages					*100
Kelp	Wood barrel	None					56
Kelp salts	Bag	do					46
Moss, dry	Bale	do					330/670
Sago	Bag	do					52
Sago flour	do	do					47
Starch:							
Domestic	do	do					64
Do	Wood box	Packages					60
Do	Wood barrel	None					65
Orient	Mat	do					72
Starch, corn	Fiber carton	Packages					49
Do	Steel drum	None					67
Tapioca:							
Flour	Bag	do					40
Pearl	do	do					43
Vehicles and parts:							
Automobiles [1]	Unboxed						
Wheels off, closed type	Wood box	Packing material					220
Wheels off, open type, tops down	do	do					170
Automobile parts:							
Frames	Loose						215
Radiators	Wood crate	None					168
Scrap	Loose						*135
Transmission machinery	Pieces						*70
Baby buggies	Wood crate	None					480

[1] Set-up weights and measurements of 10 standard makes show that they measure about 5⅓ times their weight, as an average.

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Vehicles and parts—Continued.							
Bicycles	Wood crate	None					250
Motors:							
Aero	Wood box	do					*162
Do	Skid						*325
Electric	Wood crate	None					*55
Ford	Bare						55
Motorcycles	Wood crate	None					120
Trucks, set-up [1]	Unboxed						
Vitrefax	Bag	None					25
Walnuts. (See Nuts.)							
Wax:							
Beeswax	Wood box						60
Do	Bag						58
Floor	Wood box	Tins					67
Orient	do						43
Slabs	Bag	None					40
Whale oil. (See Oil, sperm.)							
Wire:							
Barbed	Roll						54
Do	Reels	None					54
Cable, leaded	do						35
Copper	Wood box						*35
Galvanized	Coil						36
Insulated copper	Wood box						*71
Do	Reel						*50
Do	Bag						*36
Do	Coil						*49
Netting	Roll						*50
Plain	Coil						*36
Rope	Reel						*40
Welding	Wood box						16
Wood:							
Unmanufactured:							
Rattan:							
Core	Bale	None					165
Reed	do	do					335
Staves	Bundle						140
Teak, logs	Pieces						80
Square	do						70
Sawmill products:							
Boxboard	Wood crate	None					68
Cooperage stock	Bundles						*80
Cross arms	Loose						80
Excelsior, compressed	Bale	None					143

Lumber:							
Green redwood	Loose				Per M. B. F.		85
Mahogany (Philippines)	do				do		95
Oak	do				do		85
Pine (Pacific Coast)	do				do		120
Teak:							
Boards	Pieces						74
Scantlings	do						90
Sawdust	Bag	None					120
Shooks, box	Bundle						100
Ties, railroad, redwood	Loose						112
Manufacture:							
Barrels, empty	Loose						320
50-gal., oak	do						345
55-gal., steel	do						188
30-gal., steel	do						196
Breakfast nooks	Bundles	None					150
Cabinets, radio	Wood box						500
Chairs	Paper wrapper	None					*400
Chair stock	Bundle	do					*350
Doors	Loose						125
Door jamb stock	Bundles						*75
Dowels	do						68
Furniture	Wood crate	None					*400
Los Angeles	do	do					630
Norfolk	do	do					350
Tacoma	do	do					200
Furniture, rattan	Pieces						*850
Furniture, Wicker	do						*600
Handles, wooden	Bundles						100
Broom	do	None					100
Ironing boards (Los Angeles)	do						190
Ironing boards (Puget Sound)	do						400
Lath, wood	do						120
Lathe, turret	Wood box	Waterproof paper	275.0	1,250	8,500	7,250	70
Do	do	do	208.0	600	4,300	3,700	102
Panels, plywood	Fiber carton						65
Pastry boards	Bundles						100
Plywood	Fiber carton	None					65
Do	Loose	do					70
Shingles	Bundle						155
Splits, bamboo	Bale	Packing material					*90
Do	Bundle	do					*180
Splits, rattan	Bale	None					180
Wool:							
Compressed (Hawiian Islands)	Bale						100
Greasy	Bag						*215
Do	Bale						*170
High density (Orient)	do						45

[3] Measure about 2½ times their weight.

STOWAGE FACTORS—Continued

Commodity	Outer container	Inner container	Cubic feet	Tare weight	Gross weight	Net weight	Stowage factor
Wool—Continued.							
Pulled grease	Bale						160
Scoured	Bag						*625
Do	Bale						*200
Wool, grease (Degra)	Drum						50
Wool-type fiber:							
Mohair	Bag	None					225
Do	Bale	do					110
Zinc (spelter):							
Dust	Wood box						22
Ingots	Loose						10
Oxide	Paper bag	None	.9	.5	50.5	50	40
Sheets	Pieces						14
Slabs	do						11

SHIPPING, PACKING, AND STOWAGE TERMS AND DEFINITIONS

There is given below a list of common terms and definitions used in connection with ships, cargo, and stowage.

Aburton.—Another word for athwart. A term used in stowage when cargo is stowed athwartships instead of fore and aft. For example, when a cask's heads are parallel with the keel and its bilge at right angles to the keel, it is stowed "aburton."

Amidship.—In the center of the vessel, either with reference to its length or its breadth.

Athwart.—Across, or at right angles to the fore- and aft-line.

Ballot.—A small bale; usually from 70 to 120 pounds.

Beam filling.—Small packages suitable for filling the spaces between the deck beams at the top of a hold.

Bilges.—The spaces at the sides of a vessel, between the margin of tanks and the ship's skin, into which water drains and is pumped out.

Bleeding.—The act of cutting bagged cargo and allowing the contents to become loose in order to reduce the space required for stowage.

Blind hatch.—See Hatch.

Blocking off.—The operation of jamming cargo in a space not completely filled so that it will not shift in heavy weather.

Breaking bulk.—To "break bulk" is to commence to discharge.

Broken stowage.—The waste and loss of space caused by irregularity in the size and shape of packages or the incidence of hold pillars, frames, deck beams, and other obstructions. The term is also used to refer to the small packages that are used to fill up the empty spaces caused by the stowage of large, irregularly shaped packages.

Bulk.—Cargo is said to be stowed in bulk when it is stowed loose instead of being first packed in containers.

Cantline.—The space or groove between two fore and aft tiers of casks stowed side by side. When the bilge of one cask is laid in the cantline of the tier below and resting over the heads of four other casks, it is said to be stowed "bilge and cantline."

Cargo battens.—Lengths of wood usually about 6 x 1½ inches running fore and aft inside the framing of a vessel, usually about 1 foot apart, to prevent cargo from coming into contact with the shell plating, frames, etc.

Ceiling.—The wood planking of holds laid on top of double bottom tanks or floors.

Chock.—A piece of wood or other material placed at the side of a cask or package to prevent it rolling about or moving sideways.

Cleading.—A covering or lining of planks or boards to prevent radiation of heat, as on an engine-room bulkhead.

Coamings.—The sides of the hatches or other openings in a deck, standing vertically, to prevent water entering the hold from the deck.

Cubic capacity.—Each vessel has two cubic capacities: Grain cubic capacity, and bale cubic capacity.

Grain cubic capacity is the maximum space available for cargo measured in cubic feet, the measurements being taken to the inside of the shell plating of the ship or to the outside of the frames and to the top of the beams or under side of deck plating. In other words, if a bulk cargo such as grain were loaded, it would flow in between the frames and beams and occupy the maximum space available, or the vessel's grain cubic capacity.

Bale cubic capacity is the space available for cargo measured in cubic feet to the inside of the cargo battens, on the frames, and to the under side of the beams. In a general cargo of mixed commodities the bale cubic applies. The stowage of the mixed cargo comes in contact with the cargo battens and as a general rule does not extend to the skin of the ship. From figures taken from an actual cargo vessel the grain cubic amounts to 428,000 cubic feet and the bale cubic amounts to 392,000 cubic feet.

Deadweight tonnage.—See Tonnage.

Demijohn.—A large bottle up to, say, 5 gallons, covered with basketwork.

Dholl.—A small roll or bundle of skeins rolled together, used in connection with some fibers, such as coir.

Displacement tonnage.—See Tonnage.

Draught.—The depth in the water to which a vessel is immersed.

Dunnage.—Loose wood or other material placed under and around the cargo to prevent damage, wedge it in place, and to raise it above the ceiling or deck to provide a free passage for any water which may get into the hold to run into the bilges.

Even keel.—The situation of a vessel when it is so trimmed that it floats evenly in the water, neither end being immersed more than the other.

Firkin.—A small wooden cask used for butter, etc. Also a measure of capacity.

Flooring off.—Laying the first tier of cargo in the bottom of a vessel's hold.

Freeboard.—The distance from the upper (or freeboard) deck to the center of the disk which is marked on the vessel's sides and which indicates the position of the load waterline in summer.

Full and down.—A ship is said to be "full and down" when its cargo spaces are full and it is down to its marks. With an extremely light cargo, the vessel would be full, but not down to its marks. With a heavy cargo such as ore, it will be down to its marks, but its total cargo space will not be filled.

Gross tonnage.—See Tonnage.

Ground tier.—The bottom tier of cargo in a vessel's hold.

Hatch or hatchway.—An opening in the deck to allow cargo to be taken up and down to the holds. The coverings over these openings are called hatch covers, and are made of wood or metal. In refrigerated holds under the ordinary hatch covers an insulated hatch is fitted, called a "plug hatch." A "blind hatch" is a hatch opening in a 'tween-deck over which extends the unbroken expanse of the deck above.

Immersion scale.—A scale showing the number of tons required to immerse or put down the ship at all its various draughts. Necessarily each ship has its own scale.

Jettison.—The throwing overboard of cargo to lighten the ship in case of peril.

List.—The inclination of a vessel to one side.

Longer.—A longer is an athwartship row or line of barrels or casks.

Lugs.—The bunched-up corners of a bag. Also a box used for the carriage of fresh vegetables.

Marks (freeboard).—The term used to designate the waterline to which a vessel may be loaded.

Nesting.—Fitting one article of cargo inside the other to economize space.

Net tonnage.—See Tonnage.

Parcels.—A term used in relation to cargo to indicate a small quantity.

Pilferage.—When cargo is broached and part of the contents stolen it is called pilferage or pillage.

Plug hatch.—See hatch.

Pocket.—A small bag, usually about half the size of an ordinary bag, containing such articles as hops, myrabolans, etc., often shipped from Eastern ports at reduced freight and used for broken stowage.

Quoin.—A wooden wedge used in the stowage of casks to secure them against movement.

Register tonnage.—See Tonnage.

Relieving boards.—Cases and other containers stowed in the bottom of a hold are protected as much as possible by placing dunnage every few feet of depth to take up or equalize the strain imposed by the cargo above. These are sometimes called "relieving boards."

Robbin.—A package in which spices, rice, etc., are shipped from Indian and East Indian ports.

Run.—The narrowing of the after part of a vessel's hold as it approaches the stern. Cargo will always stow badly in the "run."

Scroon.—A package or bale, as of tobacco or indigo, covered with hides, or wood bound with hide.

Skin.—This word used in relation to a vessel means the inside of the outer shell plating.

Small stowage.—A term used to define small packages or items of cargo that can be used to fill in broken stowage spaces.

Stiff.—A vessel is stiff when its center of gravity is low, making it careen with difficulty.

Stiffening.—Ballast or heavy cargo used to adjust the ship's center of gravity, and trim, to its needs.

Tare.—This word means weight, and is usually applied to the weight of a container when empty.

Tare and tret.—Allowance made for the weight of a container and wastage.

Tender.—A ship is tender when its center of gravity is high, making it careen easily.

Tonnage.—The different types of tonnage are defined below:

Cargo deadweight tonnage.—The number of tons (2,240 pounds per ton) which remain after deducting fuel, water, stores, dunnage, and such other items necessary for use on a voyage, from the deadweight tonnage of the vessel.

Deadweight tonnage.—The carrying capacity of a ship in tons of 2,240 pounds. The difference between the displacement light and the displacement loaded.

Displacement tonnage, light.—The weight of the ship excluding cargo, passengers, fuel, water, stores, dunnage, and such other items which are necessary for use on a voyage.

Displacement tonnage, loaded.—The weight of the ship including cargo, passengers, fuel, water, stores, dunnage, and such other items necessary for use on a voyage, which brings the vessel down to its maximum draft. It may also be defined as the total quantity of water displaced by the vessel when in the above condition.

Gross tonnage.—The entire internal cubic capacity of the holds and erections on and/or above the upper deck to the hull of the ship expressed in tons of 100 cubic feet, except certain spaces which are exempted such as: Peak and other tanks for water ballast; open forecastle, bridge, and poop; excess of hatchways; certain light and air spaces; domes and skylights; condenser; anchor gear; steering gear; wheel house; galley; cabins for passengers (when on decks not to the hull); and other items.

Net tonnage.—The tonnage of a ship remaining after certain deductions have been made from the gross tonnage expressed in tons of 100 cubic feet. Among the deductions are: Crew spaces; master's cabin; navigation spaces; donkey engine and boiler; shaft trunks; allowance for propelling power; and other items.

Power tonnage.—This is used to classify the ship for the purpose of establishing the rates of pay of the ship's officers and is calculated by adding together the gross tonnage and the indicated horsepower of the ship. The result is power tonnage.

Register tonnage.—Register tonnage is applicable to both gross and net—in other words, it can be expressed as gross register tonnage or net register tonnage. However, it is ordinarily used to refer to net register tonnage. Register tonnages are so named because they are the tonnages shown on the documents of registration issued for each vessel in its home country.

Underdeck tonnage.—Underdeck tonnage is a measure of the internal space between the top of the ceiling or double bottom in the hold and the under surface of the tonnage deck. The unit of measurement is a ton of 100 cubic feet.

In single- and two-deck vessels the tonnage deck is the uppermost deck; in the case of other vessels the underdeck tonnage is measured up to the second continuous deck. The uppermost complete deck without openings such as would exempt any space from inclusion in tonnage is considered the "upper deck" and the volume of space between the "tonnage" and the "upper" deck is termed "'tween-deck tonnage."

Suez and Panama Canal tonnages.—These are arrived at along the same lines as are the gross and net tonnages. Each is, as a rule, larger than the register tonnage because of the inclusion of space which, under national measurement rules, is exempted.

Topping off.—The stowage of cargo in the top of the hold to fill in the uppermost portion of the hold. Bagged cargo is frequently used for this purpose.

Truss.—A bundle, such as a truss of hay.

Ullage.—The deficiency from the normal capacity of the quantity contained in a cask.

Underdeck tonnage.—See Tonnage.

Wings.—The sides of a vessel's holds. Cargo stowed along the sides of a vessel is said to be stowed in the "wings," and the outside tier is known as a "winger."

WEIGHTS AND MEASURES USED IN SHIPPING

GRAIN MEASURES

UNITED STATES GRAIN MEASURES

The following measures are used in connection with grain shipped from United States ports:

Item	Pounds per bushel	Pounds per quarter [1]	Bushels per load	Tons per load	Cubic feet per load	Bushels per ton
Wheat	60	480	8,000	214	10,000	37.3
Corn	56	480	8,570	215	10,700	40.0
Rye	56	480	8,500	214	10,700	40.0
Barley:						
United Kingdom	48	400	8,333	179	10,416	46.66
Continent	48	400	10,000	214	12,800	46.66
Oats	32	320	10,000	143	10,000	70.0

[1] 1,000 quarters equal 1 load.

It should be noted that, while the United States bushel, containing 2,150.42 cubic inches, is the unit commonly used in the United States grain trade, the British bushel, which is 3 percent larger, is sometimes used in other trades. Thus, a United States bushel of wheat weighs 60 pounds, but a British bushel weighs approximately 62 pounds. In the United States a quarter of wheat (8 bushels) equals 480 pounds; but in the Baltic and some other trades in which the British bushel is used as a basis, a quarter of wheat equals 496 pounds.

BALTIC SEA GRAIN MEASURES

In the Baltic a unit known as the "chetvert" is employed, the capacity of this measure varying with the grain under consideration. The true equivalent of the chetvert in British imperial measure is 5,775 bushels. A subunit of the chetvert is the "pood," which is equivalent to 36.113 pounds (average). Tons, kilograms, and quarters are also in use; but freight is usually quoted per ton of 62 poods.

Conversion factors for chetverts and poods follow:

1 chetvert of wheat=10 poods; oats=6 poods; rye=9 poods; linseed=9 poods; and barley=8½ poods.

1,000 quarters of wheat (496 pounds a quarter)=1,373.476 chetverts of 10 poods, or 221 tons 8 hundredweight 2 quarters 8 pounds, or 224,981.65 kilograms.

1,000 quarters of oats (320 pounds a quarter)=1,476.856 chetverts of 6 poods, or 142 tons 17 hundredweight 0 quarters 16 pounds, or 145,149.45 kilograms.

1,000 quarters of rye (480 pounds a quarter)=1,476.856 chetverts of 9 poods, or 214 tons 5 hundredweight 2 quarters 24 pounds, or 217,724.18 kilograms.

1,000 quarters of linseed (424 pounds a quarter)=1,304.556 chetverts of 9 poods, or 189 tons 5 hundredweight 2 quarters 24 pounds, or 192,323 kilograms.

1,000 quarters of barley (400 pounds a quarter)=1,303.108 chetverts of 8½ poods, or 178 tons 11 hundredweight 1 quarter 20 pounds, or 181,436.81 kilograms.

1,000 chetverts of wheat (10 poods to the chetvert)=728,080 quarters, or 161 tons 4 hundredweight 1 quarter 12 pounds, or 163,804.62 kilograms.

1,000 chetverts of oats (6 poods to the chetvert)=677.114 quarters, or 96 tons 14 hundredweight 2 quarters 13 pounds, or 98,282.77 kilograms.

1,000 chetverts of rye (9 poods to the chetvert)=677.114 quarters, or 145 tons 1 hundredweight 3 quarters 19 pounds, or 147,424.16 kilograms.

1,000 chetverts of linseed (9 poods to the chetvert)=766.544 quarters, or 145 tons 1 hundredweight 3 quarters 19 pounds, or 147,424.16 kilograms.

1,000 chetverts of barley (8½ poods to the chetvert)=767.396 quarters, or 137 tons 0 hundredweight 2 quarters 23 pounds, or 139,233.93 kilograms.

BRITISH CORN (GRAIN) MEASURE AND METRIC EQUIVALENTS

1 bushel=8 gallons=3.637 decaliters. One decaliter=2.20 gallons.
1 quarter=8 bushels=2.900 hectoliters. One hectoliter=2.75 bushels.
Load=5 quarters=14.545 hectoliters.
Last=10 quarters=29.090 hectoliters.

FOREIGN MEASURES USED IN CONNECTION WITH GRAIN

Country	Measure	Equivalent
Argentina	Arroba	25.35 pounds.
	Fanega	1½ imperial bushels.
Bolivia	Quintal	100 libras=101.44 pounds.
	Arroba	25.36 pounds.
Brazil	do	32.38 pounds.
	Quintal	129.54 pounds.
Chile	Arroba	25.36 pounds.
	Quintal	101.44 pounds; 20 quintals=1 tonnelada.
China	Tael	1.333 ounces=37.78 grams.
	Catty	1.333 pounds=604.53 grams.
	Picul	133.333 pounds=60.453 kilograms.
Crete	Oke	2.8 pounds.
Denmark	Centner	110.23 pounds.
	Toinde (Toime)	3.827 bushels.
Egypt	Ardeb	5.44739 bushels.
	Oke	2.7513 pounds.
	Cantar	100 rotts or 36 okes=99.0492 pounds.
	Cantar of Alexandria	112 okes.
	Herni	200 okes.
	100 ardebs of wheat	62½ quarters; 100 ardebs of beans=65½ quarters.
Greece	Oke	2.832 pounds; 791 okes=1 ton.
	Cantar	124.6 pounds=44 okes.
	2,128 great venetian pounds	2,240 pounds (a currant measure).
Honduras	Fanega	1½ imperial bushels.
Hong Kong	Tael	1⅓ ounces.
	Catty	1⅓ pounds.
	Picul	133⅓ pounds.
Italy	Tonnellata	2,200 pounds.
	Ettolitro	2.75 imperial bushels.
	288 hectoliters wheat	100 quarters.
Japan	Catty	1.322 pounds.
	Picul	132.27 pounds.
	Koku	4.9629 bushels.
Mexico	Arroba	25. 357 pounds=23 libras.
Netherlands Indies	Catty	1.36 pounds.
	Picul	136 pounds.
Paraguay	Arroba	25.35 pounds.
	Fanega	1½ imperial bushels.
Straits Settlements	Picul	133⅓ pounds=100 kati.
Turkey	Oke	2.8283 pounds.
	Almud	1.151 imperial gallons.
	Kilch	0.912 imperial bushel.
U. S. S. R.	Pood	36.113 pounds; 100 poods=1.6121 tons.
	Chetvert	5.77 imperial bushels.
Archangel	100 chetverts wheat	70 quarters; 100 chetverts oats =68 quarters.
Odessa	do	72 quarters; 100 chetverts linseed=83 quarters.

GRAIN WEIGHT EQUIVALENTS

Black Sea Ports

1 chetvert of wheat=10 poods=360 pounds.
1 chetvert of rye=9 poods=324 pounds.
1 chetvert of barley=8 poods=288 pounds.
1 chetvert of oats=6 poods=216 pounds.
1 chetvert of coarse bran=3 poods=108 pounds
1 chetvert of fine bran=4 poods=144 pounds.
1 chetvert of oily seeds=9 poods=324 pounds.

Persion Gulf Ports

1 ton of wheat=2,240 pounds.
1 ton of barley=1,792 pounds.

LUMBER MEASUREMENTS

Throughout the United Kingdom and Europe lumber cargoes are commonly measured by the "Petrograd Standard." Various other "standards" and units of measure are also found, and the principal ones, together with their equivalents in board feet and cubic feet, are given below.

Standard	Pieces	Dimension	Board feet	Cubic feet
Petrograd standard	120	1½ inches by 11 inches by 12 feet	1,980	165
Christiania standard	120	1¼ inches by 9 inches by 11 feet	1,237½	103.12
London or Irish standard	120	3 inches by 9 inches by 12 feet	3,240	270
Quebec standard	100	2½ inches by 11 inches by 12 feet	2,750	292.2
Drammen standard	120	2½ inches by 6½ inches by 12 feet	1,462½	121.9
Drontheim standard of sawn deals			2,376	198
Drontheim standard of square timber			2,160	180
Drontheim standard of round timber			1,728	144
Wyburg standard of sawn deals			2,160	180
Wyburg standard of square timber			1,963	163.5
Wyburg standard of round timber			1,560	130

1 Petrograd standard deal is 1 piece (3 inches by 11 inches by 6 feet).

100 Petrograd standard deals equal 60 Quebec deals.

Deals, battens, boards, and scantlings pay freight per Petrograd standard hundred, which equals approximately 3 tons in weight and stows in about 240/265 cubic feet. It is also paid at the rate of three loads to a Petrograd standard.

A board foot (American) or superficial foot (English) means an area of 1 square foot of plank 1 inch thick. Thus, 12 board feet or 12 superficial feet make 1 cubic foot of lumber.

WEIGHTS AND MEASURES USED IN CONNECTION WITH PACIFIC COAST LUMBER STOWAGE

110 cubic feet to 1,000 board feet (good stowage).
125 cubic feet to 1,000 board feet (ordinary stowage).
130 cubic feet to 1,000 board feet (poor stowage).
1,000 board feet equal 83⅓ cubic feet.
Pine, dry, 1,000 board feet weigh 2,500 pounds to 2,800 pounds.
Lumber, dry, 1,000 board feet weigh 2,500 pounds to 3,200 pounds.
Green lumber, 1,000 board feet weigh 3,600 pounds to 4,000 pounds.

100 board or superficial feet of planking=1 square.
120 deals=A "hundred" deals.
108 cubic feet (12 feet by 3 feet by 3 feet)=1 stack (½ a fathom).
216 cubic feet (6 feet by 6 feet by 6 feet)=1 fathom. Estimated weight=dry, 2¾ tons; wet, 3 to 3½ tons.
128 cubic feet=(8 feet by 4 feet by 4 feet)=1 cord.
50 cubic feet of squared timber= 1 load.
40 cubic feet of unhewn timber=1 load.

A standard of timber stows in about 270 cubic feet.
A standard of hewn timber weighs approximately 4 tons.
A standard of sawn timber weighs approximately 3½ tons.
A standard of lumber weighs approximately 3 tons.

600 square feet 1-inch boards=1 load of 50 cubic feet.
400 square feet 1½-inch boards=1 load of 50 cubic feet.
300 square feet 2-inch boards=1 load of 50 cubic feet.
200 square feet 3-inch deals=1 load of 50 cubic feet.
150 square feet 4-inch deals=1 load of 50 cubic feet.
218 running feet 3 by 11 planks=1 load of 50 cubic feet.
267 running feet 3 by 9 deals=1 load of 50 cubic feet.
343 running feet 3 by 7 battens=1 load of 50 cubic feet.

The following terms are in common use but vary in different localities. Usually, however:

- Pieces of timber up to 7 inches broad are known as "battens."
- Pieces of timber 8 to 11 inches broad are known as "deals" (2 inches and up thick).
- Pieces of timber of 11 inches (and up) are known as "planks" (2 inches thick and over).

A "board" implies a thickness of less than 2 inches.
A "scantling" is a piece of timber up to 6 inches wide, and 2 inches thick.

THE METRIC UNIT OF TIMBER MEASURE

The metric unit is the "stere" which is equal to the cubic meter.
1 stere = 35.314 cubic feet.
1 stere = 0.2759 cord.
1 cubic foot = 0.028317 stere.
1 cord = 3.624 steres.
1 metric ton = 0.9842 long ton.
1 metric ton = 1.1023 short ton.
1 Petrograd standard contains 4.6723 cubic meters.

To Calculate Board Measure

$$\frac{\text{Thickness} \times \text{width (in inches)}}{12} \times \text{length in feet} = \text{board measure feet, or square feet of planking 1 inch thick.}$$

THE BRERETON LOG SCALE

Below is given a brief description of the salient features of the Brereton log scale, which was prepared by the inventor of the scale, Bernard Brereton, for Lloyd's Calendar, and is reprinted therefrom.

The Brereton Log Scale gives the actual or solid contents of logs in board feet, based on the average middle diameter in inches.

Method of scaling.—Take the average diameter to the nearest inch at both ends of the log, inside the bark, add both diameters together and divide their product by 2. This gives the mean or average diameter at the middle length of the log for all practical purposes.

Certificate of shipment.—Practically all logs exported from the Pacific Coast are measured and their contents computed according to the Brereton log scale. In nearly all cases both buyers and sellers require a certificate issued by the Pacific Lumber Inspection Bureau, Inc., giving number of logs, contents, grade, marks, and condition.

Square of mean diameter rule.—When freight is based on this rule, the measurements and contents are computed according to the Brereton scale with 27.32 percent added to the total, which equals the square of the mean diameter.

There is a false impression among some shipping men and exporters that the square of the mean diameter represents a stowage factor for logs, which means that logs will stow in a space equal to the square of their mean diameter, but this is a mistake, as the square of the mean diameter equals a stowage factor of only 106 cubic feet bale space. As the recognized stowage factor for sawn lumber shipped from the Pacific Coast is 120 cubic feet bale space, it shows how unreasonable it would be to suppose that round logs could be stowed in less space than sawn lumber.

The correct use of the "square of the mean diameter" rule is for estimating the rate of freight on logs that would be equivalent to lumber based on the ratio of space occupied.

For example, take a log 30 feet long and 20 inches mean (middle) diameter, the square would be 20 by 20 inches, and according to the square of the mean diameter rule, it would stow under deck in the same space that would be occupied by a timber 20 inches square of the same length. But as the contents of the square timber equal 1,000 board feet, and the correct actual contents of the log only 785 board feet, Brereton scale, it is necessary to add 27.32 percent to the amount given in the Brereton scale to equalize the amount of freight rate on logs that would be equivalent to lumber.

MEASUREMENTS USED IN FRENCH LUMBER TRADE

(BY BERNARD BRERETON)

American lumber is sold to French importers based on various measurements. Softwoods are generally sold on the basis of the Petrograd standard (1,980 board feet) which is also applied to North European lumber. Square timber is quoted

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on the basis of English loads equal to 50 cubic feet or 600 board feet. American hardwoods, on the other hand, are usually sold on the basis of 1,000 board feet. Plywood and veneer are sold on the basis of square meters or square feet. Imported mining timber, pit props, and similar products are sold on the basis of the English fathom, which is equal to 216 cubic feet, or on the basis of cubic meters. Logs are bought and sold on a weight basis, the logs being discharged directly on the public scale, placed along ship's side, and weighed by the official weigher.

JAPANESE LUMBER MEASUREMENTS

(BY BERNARD BRERETON)

The standard lumber measurement employed by the Japanese is the "koku," which equals 10 cubic feet or 120 board feet. The koku contains 10 cubic shaku, and as the cubic shaku is equivalent to 1 cubic foot, the conversion of the koku to board feet and board feet to the koku is a very simple operation.

The shaku is a measure used by the Japanese in the same way that we use a foot rule, but instead of being divided into twelfths or inches as ours is, it is divided into tenths and these are called "sun." Thus 10 sun make 1 shaku, and 1 shaku equals 0.994 of a foot.

Japanese Measurements Converted to English and Metric Equivalents

1 sun=1.19303 inches=30.3 millimeters.
33 sun=39.37 inches=1 meter in length.
1 shaku=0.994 foot=303 millimeters.
3.3 shaku=39.37 inches=1 meter in length.
3.5314 koku=423.768 board feet=1 cubic meter.

Brereton Log Scale Converted to Japanese Lumber Units

1,000 board feet, Brereton log scale=6.41 shakujime.
1,000 board feet, Brereton log scale=8.333 koku.
1,000 board feet, Brereton log scale=83.333 cubic shaku.
1,000 board feet, Brereton log scale=2.36 cubic meters.

Japanese Lumber Units Converted to Brereton Log Scale

1 shakujime=156 board feet, Brereton log scale.
1 koku=120 board feet, Brereton log scale.
1 cubic shaku=12 board feet, Brereton log scale.
1 cubic meter=424 board feet, Brereton log scale.

NOTE.—The above conversion factors give the same result when applied to lumber as they do to logs, Brereton scale.

Japanese Measurement Conversion Factors

Japanese koku						Japanese sun			
Koku	Cubic shaku	Board feet	Cubic meters	Cubic meters	Koku	Inches	Sun	Sun	Inches
1	10	120	0.28318	1	3.5314	1	0.8382	1	1.193
2	20	240	.56636	2	7.0628	2	1.6764	2	2.386
3	30	360	.84954	3	10.5942	3	2.5146	3	3.579
4	40	480	1.13272	4	14.1256	4	3.3528	4	4.772
5	50	600	1.41590	5	17.6570	5	4.1910	5	5.965
6	60	720	1.69908	6	21.1884	6	5.0292	6	7.158
7	70	840	1.98226	7	24.7198	7	5.8674	7	8.351
8	80	960	2.26544	8	28.2512	8	6.7056	8	9.544
9	90	1,080	2.54862	9	31.7826	9	7.5438	9	10.737
10	100	1,200	2.83180	10	35.3140	10	8.3820 (more)	10	11.930
						11	9.2202	11	13.123
						12	10.0584	12	14.316

DANUBE LUMBER MEASUREMENTS

1 wagon load=22 cubic meters=(770–780 cubic feet), with approximate weight, 10 tons.
1 rully=12 feet by 6 feet by 3 feet=1 fathom (216 cubic feet). Estimated weight, 3¼ tons.
1 tuit=12 beams of baulks each 18 feet long (216 running feet of timber) with a top measurement of 11 inches.

MISCELLANEOUS MEASURES

1 Riga last contains 960 superficial feet of sawn deals or squared timber.
Lathwood.—Generally stacked in fathoms of 216 cubic feet (2,592 superficial feet) or otherwise in piles measuring 6 feet by 6 feet by 8 feet=288 cubic feet.
1 bundle of plaster laths=360 running feet.

Laths.—West Coast South America standard ⅓ inch by 1½ inches by 4 feet; tied in bundles of 100 pieces.

Australia standard:

⅓ inch by 1 inch by 4½ inches	Tied in bundles of 90 pieces
⅓ inch by 1¼ inches by 4½ inches	
½ inch by 1½ inches by 4½ inches	

VEGETABLE OILS

[U. S. Bureau of Standards]

Oil	Gallons per long ton	Oil	Gallons per long ton
Amber	336	Olive	293
Aniseed	270	Palm	297
Camphor	295	Peanut	300
Castor	277	Pine	310-316
Coconut	290	Poppy	290
Cottonseed	290	Rapeseed	294
Lavender	306	Resin	281
Lemon	318	Turpentine	278
Linseed	285	Valerian	306

INDIAN TONNAGE SCALES

While 40 cubic feet to the ton is the generally accepted basis for cargo measurement (in American and British trades), there is a variation to this general rule in connection with homeward shipments from India to the United Kingdom and elsewhere. These are based on an equivalent of 50 cubic feet to the ton, which implies that imports from India, as a class, are bulkier than exports to India. There are independent scales appertaining to Calcutta, Bombay, Madras, and Karachi, covering the products exported from these regions. Comment on these scales by a writer in the Times Trade Supplement[3] is as follows:

"The Indian scales may be defined as setting out the equivalent measurement capacities of practically all Indian exports. The ratios have all been agreed upon between the chambers of commerce and the shipping companies, and the lists have been added to from time to time as occasion required.

"Some of India's principal exports conform to the standard equivalent of 50 cubic feet to the ton of 20 hundredweight. Among these are tea, jute, hides and skins, and kapok in pressed bales. But when hides and skins are shipped loose or in small bundles, it is assumed that only 14 hundredweight instead of 20 hundredweight occupy the space of 50 cubic feet. Similarly, kapok seeds in bags are bulkier than kapok in pressed bales, and so 16 hundredweight of kapok seeds are assumed to occupy 50 cubic feet.

"The Ceylon scale discloses many discrepancies between the ratios of weight to measurement in various commodities. Thus citronella oil in drums is calculated on the basis of 18 hundredweight to 50 cubic feet; divi-divi in bags is calculated on the basis of 16 hundredweight; sapanwood and sandalwood are calculated on the basis of 10 hundredweight to 50 cubic feet, because they are light woods, whereas 20 hundredweight of ebony and satinwood, being heavy woods, are assumed to measure 50 cubic feet. Gambier in bags is calculated

[3] April 21, 1933.

on the basis of a ton consisting of 10 hundredweight, and cocoa in bags on the basis of 14 hundredweight, while two or three commodities, notably cellulose and coir yarn, are assumed to occupy 50 cubic feet for each 8 hundredweight. In the case of coir in bundles, or loose ballots, and coir yarn and fibers in bundles or ballots, only 6 hundredweight occupy the space of 50 cubic feet. The ton of cinnamon in cylindrical bales is assumed to be 1,200 pounds, instead of 2,240 pounds. A "ton" of cinnamon chips, and barks and chips of cinchona in bags, consists of 800 pounds for freight calculations.

"The various Eastern scales are recognized throughout the trade; the freight on all shipments will be calculated according to them or on a deadweight basis. Some grains and ore are carried as deadweight, and the freight calculation in the case of a deadweight will be a rather simpler matter than the calculation of the freight on two or three commodities with which the ratios between measurement and weight have to be taken into account. Should the commodities be transshipped in this country to coasting or short-distance vessels, then the ordinary standard equivalent of 40 cubic feet to 20 hundredweight will apply, and the freight rate on cargo brought from the East on different scale terms will have to be adjusted."

Indian Tonnage Scale

Article	Calcutta	Bombay	Madras	Karachi
Alum		In bags, 16 cwt.	20 cwt.	In bags, 16 cwt.
Arrowroot		In cases, 40 cu. ft.	In cases, 50 cu. ft.	Do.
Asafetida		do	In bags, 20 cwt. In cases, 50 cu. ft.	In cases, 40 cu. ft.
Barley	20 cwt	In bags, 15 cwt		In bags, 15 cwt.
Beeswax	do	In cases, 40 cu. ft.	20 cwt	In bags, 40 cu. ft.
Betelnuts	do	In bags, 13 cwt	18 cwt	In bags, 13 cwt.
Blackwood		In straight, square logs, 40 cu. ft. Otherwise, 16 cwt.		In straight, square logs, 40 cu. ft. Otherwise, 16 cwt.
Bonemeal, etc	20 cwt	Meal and dust, 20 cwt.	20 cwt	Meal and dust, cwt.
Bones	Crushed, 20 cwt. or 50 cu. ft. (at ship's option).	Crushed in bags as per the Chamber standard.	Bone sinews, in bales, 50 cu. ft.	Loose, 8 cwt.
Borax (or tincal)	20 cwt	In cases, 40 cu. ft. In bags, 16 cwt	In bags, 20 cwt. In cases, 50 cu. ft.	In cases, 40 cu. ft. In bags, 16 cwt.
Bran	14 cwt	In bags, pressed, 10 cwt. In bags, unpressed, 9 cwt.		In bags, pressed, 10 cwt. Unpressed, in bags 9 cwt.
Camphor	In cases, 50 cu. ft.	In cases, 40 cu. ft.	In cases, 50 cu. ft.	In cases, 40 cu. ft.
Canes or rattans (see also Rattans).	Rattans for dunnage, 20 cwt. or 50 cu. ft. (ship's option).	In bundles, 13 cwt.		In bundles, 13 cwt.
Cardamoms	In robbins, 8 cwt. In boxes, 50 cu. ft.	In bundles, 40 cu. ft.	In cases, 50 cu. ft. In bags, 10 cwt.	In bundles, 40 cu. ft.
Cassia	In boxes, 12 cwt.	Cassia, lignea, fistula and buds, 40 cu. ft.	In bags, 12 cwt In cases, 50 cu. ft.	Cassia, lignea, fistula and buds, 40 cu. ft.
Castor seed	15 cwt	Bold Cawnpore description and mixture containing more than 2 percent of such, 10 cwt. Other sorts not containing more than 2 percent of Bold Cawnpore description, 12 cwt.	20 cwt	14 cwt.
Chilies	Dry, in bags or bundles, 8 cwt.		In bags, 12 cwt. In robbins, 14 cwt.	
Chinaroot		In cases, 4 cu. ft.	In bags, 11 cwt. In cases, 50 cu. ft.	In cases, 40 cu. ft.
Chiretta	In bundles, 50 cu. ft.		In bales, 50 cu. ft.	
Cigars		40 cu. ft. In cases, 40 cu. ft.	50 cu. ft.	40 cu. ft. In cases, 40 cu. ft.
Cinnamon		do	In bags, 8 cwt	Do.
Cloves	In bags, 8 cwt. In cases, 50 cu. ft.	In bags or frazils, 8 cwt.	In cases, 50 cu. ft.	In bags or frazils, 8 cwt.
Cocculus Indicus.		In bags, 13 cwt.		In bags, 13 cwt.
Cocoa		In bags, 10 cwt.		In bags, 10 cwt.
Coconut oil (see also Oil).		11 cwt.		11 cwt.

Indian Tonnage Scale—Continued

Article	Calcutta	Bombay	Madras	Karachi
Coffee	In bags, 18 cwt.	In cases, 40 cu. ft. In bags or frazils, 14 cwt.	In bags, 18 cwt. In cases, 17 cwt.	In cases, 40 cu. ft. In bags or frazils, 12 cwt.
Coir	In dholls, 10 cwt.	In bales, 40 cu. ft.	Yarn and fiber, in bales, 50 cu. ft.	In bales, 40 cu. ft.
Copra	12 cwt.	In robbins, 8 cwt. Cut copra in bags, 10 cwt.	In bags, 12 cwt.	In robbins, 8 cwt. Cut, in bags, 11 cwt.
Coral	....	Rough (not specimen) in bags, 16 cwt.	....	Rough (not specimen), in bags, 16 cwt.
Coriander seed	12 cwt.	....	20 cwt.	
Cotton	50 cu. ft.	In bales, 40 cu. ft.	In bales, 50 cu. ft.	In bales, 40 cu. ft.
Cottonseed	14 cwt.	13 cwt.	20 cwt.	13 cwt.
Cowries	20 cwt.	In cases, 40 cu. ft. In bags, 16 cwt.	....do.	In cases, 40 cu. ft. In bags, 16 cwt.
Cubebs	....	10 cwt.	....	10 cwt.
Cumminseed	8 cwt.	In cases, 40 cu. ft. In bags, 11 cwt.	....	In cases, 40 cu. ft.
Cutch	In bags, 18 cwt. In cases, 50 cu. ft., not exceeding 20 cwt. gross.	And gambier (*Terra japonica*) in bags or baskets, unscrewed, 13 cwt.	In bags, 17 cwt.	And gambier (*Terra japonica*) in bags or baskets, unscrewed, 13 cwt.
Dates	Wet, 20 cwt. Dry, 16 cwt.	Wet, 16 cwt. Dry, 13 cwt.		Wet, 16 cwt. Dry, 13 cwt.
Dhall	20 cwt.	Crushed, in bags, 17 cwt.	20 cwt.	Crushed or split, in bags, 17 cwt.
Ebony	....	Square and straight, 40 cu. ft. Otherwise, 16 cwt. Loose, 16 cwt.	....	Square and straight, 40 cu. ft. Otherwise, 16 cwt. Loose, 16 cwt.
Fennel seed	....	10 cwt.	....	10 cwt.
Fenugreek (methie seed).	....	17 cwt.	20 cwt.	17 cwt.
Fibers, all sorts	50 cu. ft.	....	Palmyra fiber. In bales, 50 cu. ft. In ballots or bundles, 10 cwt.	
Flour	....	In bags, 18 cwt. Middlings or sharps, in bags, 12 cwt.	....	18 cwt. Middlings or sharps, in bags, 12 cwt.
Galls	....	In bags, 13 cwt. In cases, 40 cu. ft.	....	In bags, 13 cwt. In cases, 40 cu. ft.
Ginger	16 cwt.	Dry in cases, 40 cu. ft. Dry in bags, 10 cwt.	In bags, 12 cwt. In cases, 50 cu. ft.	Dry in cases, 40 cu. ft. Dry in bags, 10 cwt.
Gram	20 cwt.	In bags, 17 cwt.	20 cwt.	17 cwt.
Groundnuts	....	Shelled, 14 cwt. Unshelled, 6 cwt.	.... Kernels and unshelled, 20 cwt.	Shelled, 13 cwt. Unshelled, 6 cwt.
Gums	In cases, 50 cu. ft.	Of all kinds, in cases, 40 cu. ft. Gum olibanum, in bags, 13cwt. Gum (Persian) in double bags and gum arabic in double bags, 17 cwt.	In cases, 50 cu. ft. In bags, 20 cwt.	Of all kinds, in cases, 40 cu. ft. Olibanum in bags, 13 cwt.
Gunny bags and gunny cloth.	Gunnies, 50 cu. ft. or 20 cwt. gross (at ship's option).	....	In bales, 50 cu. ft.	
Hemp	In bales, 50 cu. ft.	In screwed bales, 40 cu. ft. Loose or in bundles, 5 cwt.	....do.	In screwed bales, 40 cu. ft. Loose or in bundles, 5 cwt.
Hides and skins	....do.	Hides and skins in screwed bales, 40 cu. ft. Hides and skins loose and in small bundles, 40 cu. ft.	Hides, 50 cu. ft., tanned and dry.	In screwed bales, hides and skins, 40 cu. ft. Hides and skins loose and in small bundles, 40 cu. ft.
Hoofs, horns, etc.	Hoofs, cow and buffalo, horns and horn tips: Loose, 20 cwt. Same, in bags or bundles, 50 cu. ft. Horns, deer, in bags or bundles, 50 cu. ft.	Horns, buffalo and cow, loose, 13 cwt. Horns, deer, loose, 6 cwt. Horn tips of any kind, 13 cwt.	Hoofs, horns, shavings and tips, 20 cwt. Horns, cow, buffalo and deer, 20 cwt.	Horns, buffalo and cow, loose, 13 cwt. Horns, deer, loose, 6 cwt. Horn tips of any kind, and hoofs, 13 cwt. Buffalo horns in bundles, 6 cwt.

Indian Tonnage Scale—Continued

Article	Calcutta	Bombay	Madras	Karachi
India rubber	Rubber in cases, 50 cu. ft.		In cases, 50 cu. ft. Scrap in bags, 20 cwt.	
Indigo	50 cu. ft.	In cases, 40 cu. ft.	50 cu. ft.	In cases, 40 cu. ft.
Jowaree		In bags, 18 cwt.		
Jute	50 cu. ft.		50 cu. ft.	In bags, 18 cwt.
Kapok	do			
Kapok seed	14 cwt.			
Lac	Button, seed, stick and shellac, in bags, 16 cwt. Button, seed, stick and shellac, in cases, 50 cu. ft. Kiri lac or lac refuse, in bags, 20 cwt. Lac dye, in cases, 50 cu. ft.	Lac dye in shells or cases, 40 cu. ft.	Cake lac in bags, 16 cwt. Lac dye, 50 cu. ft. Seed lac in cases, 50 cu. ft. Seed lac in bags, 16 cwt. Shellac in cases, 50 cu. ft. Shellac in bags, 16 cwt. Stick lac in cases, 50 cu. ft. Stick lac in bags, 16 cwt.	Lac (seed in bags, 13 cwt.).
Lang (vetch)		In bags, 18 cwt. Crushed in bags, 17 cwt.		In bags, 18 cwt. Crushed in bags, 17 cwt.
Leather	In cases or bales, 50 cu. ft.		In bales, 50 cu. ft.	
Lentils	20 cwt.			20 cwt.
Linseed	do	In bags, 16 cwt.	20 cwt.	In bags, 16 cwt.
Mace		In cases, 40 cu. ft.	In cases, 50 cu. ft.	In cases, 40 cu. ft.
Maize	20 cwt.	In bags, 16 cwt.		In bags, 17 cwt.
Molasses	20 cwt. gross		20 cwt.	
Mother-of-pearl	In bags or cases, 20 cwt. gross.	In cases, 40 cu. ft. In bags, 16 cwt.	In bags, 20 cwt. In chests, 20 cwt.	In cases, 40 cu. ft. In bags, 16 cwt.
Mowra	Seed, 20 cwt.	Flowers, 18 cwt.	20 cwt.	Flowers, 18 cwt.
Munjeet (dye)	Dye, in cases, 50 cu. ft.	Or madder root in cases or bales, 40 cu. ft. Or madder root in bundles or bags, 8 cwt.	50 cu. ft.	Or madder root in cases or bales, 40 cu. ft. Or madder root in bundles or bags, 8 cwt.
Masur (dhal)		In bags, 19 cwt.		In bags, 20 cwt.
Mustard seed	20 cwt.	16 cwt.	20 cwt.	16 cwt.
Myrabolans	Whole or crushed, 20 cwt.	In bags, 14 cwt. Crushed in bags, 11 cwt. Powder, 15 cwt.	do	In bags, 13 cwt.
Nigerseed	20 cwt.	14 cwt.	do	14 cwt.
Nutmegs	In cases, 50 cu. ft.	In cases, 40 cu. ft.	In cases, 50 cu. ft.	In cases, 40 cu. ft.
Nux vomica	Seed, 16 cwt.	do In bags, 13 cwt.	20 cwt.	Do. In bags, 13 cwt.
Oats	16 cwt.		20 cwt.	
Oil	In cases, 50 cu. ft. In casks or drums, 50 cu. ft.	Of any kind, in casks, 40 cu. ft.	In cases, 20 cwt., or 50 cu. ft. (at ship's option). In casks, 20 cwt. Essential, ad valorem.	Of any kind in cases, 40 cu. ft.
Oilseed cake	20 cwt.	Oilcake powder, 16 cwt. Oilcake, machine pressed, flat, except coconut, 17 cwt. Oilcake, coconut (machine pressed, flat) of all shapes 15 cwt. Oilcake in pieces (machine pressed). 12 cwt. Oilcake of all kinds (hand or bullock pressed), 12 cwt.	Poonac, 20 cwt.	Oilcake in cakes or lumps (in bags), 16 cwt.
Paddy	16 cwt.	In bags, 13 cwt.	In bags, 20 cwt.	In bags, 13 cwt.
Peas	20 cwt.	17 cwt.	20 cwt.	White, 18 cwt.
Pepper	Long, 12 cwt. Black, 14 cwt.	In bags, 13 cwt.	In bags, 16 cwt.	In bags, 13 cwt.
Pimento		12 cwt.		12 cwt.

Indian Tonnage Scale—Continued

Article	Calcutta	Bombay	Madras	Karachi
Plumbago		In bags, 16 cwt		In bags, 16 cwt.
Pollards		In bags, 10 cwt		
Poonac (see also Oilseed cake).				
Poppyseed	20 cwt	In bags (1½ cwt.) 13 cwt.	20 cwt	In double bags, (1½ cwt.), 13 cwt.
		In double bags (1½ cwt.), 13 cwt.		In single bags (1¼ cwt.), 14 cwt.
	....do	In single bags (1¼ cwt.), 14 cwt.		In double bags (1¼ cwt.), 14 cwt.
		In double bags (1¼ cwt.), 14 cwt.		In bags (1½ cwt.), 14 cwt.
Rapeseed	....do	16 cwt	20 cwt	Rapeseed, sita, jamba, and other kinds, 16 cwt.
Rattans	For dunnage, 20 cwt. or 50 cu. ft. (at ship's option).	In bundles, 13 cwt	....do	In bundles, 13 cwt.
Redwood (dye)	For dunnage, 20 cwt. or 50 cu. ft. (at ship's option).	13 cwt	For dunnage, 20 cwt.	13 cwt.
Rice	20 cwt	In bags, 19 cwt	In bags, 20 cwt	In bags, 19 cwt.
Safflower	50 cu. ft	In cases, 40 cu. ft	20 cwt	In cases, 40 cu. ft.
		In bags, 8 cwt		In bags, 8 cwt.
Sago		In cases, 40 cu. ft	In cases, 50 cu. ft	In cases, 40 cu. ft.
			In bags, 20 cwt	
Salt	20 cwt	28 Indian mds. of 82 2/7 lb.	20 cwt	28 Indian mds. of 82 2/7 lb.
Sandalwood		9 cwt		11 cwt.
Senna	In bales, 50 cu. ft	In bags, 5 cwt	In bales, 50 cu. ft	In bags, 5 cwt.
		In bales, 40 cu. ft		In bales, 40 cu. ft.
Shells		Rough in bags, 16 cwt.	In bags, 20 cwt	Rough in bags, 16 cwt.
Silk	Raw in bales, 10 cwt.	In bales, 8 cwt	Raw in bales, 50 cu. ft.	In bales, 8 cwt.
	In cases or bales, 50 cu. ft.	In cases, 40 cu. ft	Piece goods and waste, 50 cu. ft.	In cases, 40 cu. ft.
Skins (see also Hides).	In casks, 20 cwt. gross.		Tanned and dry, 50 cu. ft.	Tanned skins in pressed bales, 40 cu. ft.
	In bales, 50 cu. ft		Wet salted and pickled in casks, 50 cu. ft.	
Soap	In bags, 15 cwt	In cases 40 cu. ft	Country, in cases, 50 cu. ft.	In cases, 40 cu. ft.
Sugar	20 cwt	In double bags, 19 cwt.	Including jaggery, in bags, 20 cwt.	In bags, 19 cwt.
Talc	In cases, 20 cwt. gross.	16 cwt	Mica talc and splittings, in cases, 50 cu. ft.	16 cwt.
Tallow	In cases or casks, 20 cwt. gross.	40 cu. ft		40 cu. ft.
Tamarind	....do	15 cwt	In cases and casks, or bundles, 20 cwt.	15 cwt.
Tea	50 cu. ft	In chests, 40 cu. ft	50 cu. ft	In chests, 40 cu. ft.
Tilseed or gingelly.	20 cwt	14 cwt	20 cwt	15 cwt.
Teak		Square planks and poon, 40 cu. ft.		Square planks and poon, 40 cu. ft.
Timber	50 cu. ft		20 cwt. or 50 cu. ft. (at ship's option).	
Tobacco	In bales or cases, 50 cu. ft.	In bales, 40 cu. ft	In bales, 50 cu. ft	In bales, 40 cu. ft.
Turmeric	16 cwt	In bags, 11 cwt	In bags, 16 cwt	In bags, 11 cwt.
Wheat	20 cwt	18 cwt		18 cwt.

BLACK SEA SCALE UNITS FOR FREIGHT

A recognized freight scale is published in connection with the export trade from the Black Sea, in which the long ton has varying weight equivalents. Freight is paid on the basis of the particular "ton" employed. The following table gives the equivalent weights for the various tons.

Commodity	English pounds	Kilograms	Commodity	English pounds	Kilograms
Wheat			Rapeseed	2,170	983
Maize			Dodder		
Peas	2,240	1,016	Cameline	2,100	951
Beans			Barley		
Millet seed			Mustard seed	2,050	929
Rye			Sesame		
Dari	2,220	1,006	Hemp seed	1,800	815
Canary seed			Oats	1,600	725
Linseed	2,170	983	Poppy seed	1,400	634

BEER, WINE, AND SPIRIT MEASURES

ENGLISH ALE AND BEER MEASURE

2 pints=1 quart (or pot).
4 quarts=1 gallon.
9 gallons=1 firkin.
18 gallons=1 kilderkin.
36 gallons=1 barrel.
54 gallons=1 hogshead.
72 gallons=1 puncheon.
108 gallons=1 butt.

WINE MEASURE

4 gills=1 pint.
2 pints=1 quart.
4 quarts=1 gallon.
10 gallons=1 anker (brandy).
18 gallons=1 runlet.
42 gallons=1 tierce.
63 gallons=1 hogshead.
126 gallons=1 pipe or butt.
252 gallons=1 tun.

NOTE.—The gallons mentioned in the above measure are the old Winchester wine gallons, one of which equals 0.8331 imperial gallon.

A pipe of wine is a varying quantity according to the kind of wine which it contains.

It should be noted that a cask is not a legal measure, but merely a vessel to contain liquid. The firkin, kilderkin, and others, are, strictly speaking, the names given to casks of sufficient size to contain the reputed quantity.

DEFINITION OF WINE AND SPIRIT CASKS

(British Colonial Wine and Rum Excepted)

	Gallons
Half quarter cask	10 and under 20
Quarter cask	20 and under 33
Third cask	33 and under 43
Hogshead	43 and under 66
Pipe, butt, or puncheon	66 and under 126
Large casks	126 and under 160
Unsizable	160 and upward

WINE AND SPIRIT CASK STANDARDS

	Gallons	Liters
Pipe of port or tarragona	115	522. 48
Pipe of Madeira	92	418. 00
Pipe of Marsala	93	422. 54
Pipe of Lisbon	117	531. 37
Pipe of vidona	100	454. 4
Butt of sherry	108	490. 68
Puncheon of brandy	120	545. 20
Hogshead of brandy	60	272. 60
Hogshead of Geneva	72	327. 13
Aum of hock, etc	30	136. 30
Quarter of port	28	127. 22
Hogshead of sherry	54	245. 34
Hogshead of port	57	258. 97
Hogshead of claret and burgundy	46	209. 00
Tonneau of claret	190	863. 25
Barrique of claret (Bordeaux)	49	225. 00
Quarter of sherry	27	122. 67
Quarter of brandy	30	136. 30
Puncheon of rum (varies)	93	422. 54
Butt of whisky	108	490. 68
Hogshead of whisky	55	249. 89
Quarter cask of whisky	28	127. 22
Octavo of whisky	15	68. 15

COTTON AND COTTONSEED

Cotton bales are exceedingly variable. United States average 510 to 540 pounds; Egyptian, 719 pounds; East Indian, 306 pounds; Brazilian, 220 pounds. The great bulk of United States cotton exported is in "high density" compressed (32 pounds to the cubic foot) bales. These measure 24 inches by 58 inches by 18 inches, and weigh on the average from 510 to 540 pounds. They measure 14.5 cubic feet when newly compressed, but spring somewhat with handling, so that they do not stow as closely when shipped from Northern as from Southern ports.

ALEXANDRIA BALES

One Alexandria export bale of steam-pressed cotton equals approximately 736 pounds net, 758 pounds gross.

One bale of up-country hydraulically pressed cotton equals approximately 850 pounds.

One ardeb of cottonseed equals 267 pounds.

Eight ardebs of cottonseed equal approximately 1 metric ton.

JUTE AND FLAX

AVERAGE WEIGHTS AND CUBIC CONTENTS OF BALES OF JUTE AND FLAX

Jute is packed in bales of 400 pounds each, and the freight is payable per ton of 5 bales, which must not exceed 52 cubic feet, or, say, 10⅖ cubic feet per bale.

Flax is packed in a great variety of ways, and in bales and packages of different sizes and weight, but generally in bales of about 4 hundredweight each. The freight is always paid per ton of 20 hundredweight, weighing 63 poods, and for general purposes the approximate measurements of a ton of flax, *as stowed on board a vessel*, in the Baltic ports, may be taken as 155 cubic feet (Lloyd's Calendar).

PETROLEUM PRODUCTS

The following table gives representative weights of petroleum products shipped in international trade. The figures given are approximate or representative only, used by the United States Bureau of Mines in converting international-trade data. They should, therefore, be used only for rough estimating. When API (American Petroleum Institute) or specific gravity of product is known, the second table given below—"Conversions, Gravities, and Weights For Petroleum Products"—should be used.

Representative Weights of Petroleum Products in International Trade

Product	Gallons per pound	Pounds per gallon	Pounds per barrel	Barrels per short ton	Barrels per metric ton
Aviation gasoline	0.171	5.83	245	8.16	9.00
Motor gasoline	.162	6.17	259	7.72	8.50
Kerosene	.148	6.76	284	7.04	7.75
Gas oil, Diesel oil, distillate fuel oil	.138	7.24	304	6.58	7.25
Residual fuel oil	.127	7.88	331	6.04	6.66
Lubricating oils	.133	7.51	315	6.35	7.00
Mineral oils, n. o. s.	.133	7.51	315	6.35	7.00
Benzol	.136	7.36	309	6.47	7.14
Mineral spirits	.160	6.24	262	7.63	8.40
Paraffin wax			280	7.14	7.87
Petrolatum			280	7.14	7.87
Grease			350	5.71	6.30
Asphalt and road oil			364	5.50	6.06
Petroleum coke			400	5.00	5.50

The density of an oil is expressed in degrees Baumé at 60° F.

The specific gravity of a liquid varies rapidly with change of temperature. Fuel oils expand with rise of temperature to the extent of nearly 1 percent for every 25 degrees above standard temperature of 60° F., the variation of volume being 0.0365 percent for each degree of variation, increasing in volume above and decreasing below 60° F. The specific gravity of heavy oils at any temperature equals the specific gravity at 60 degrees, plus or minus (according

as to whether the temperature is below or above 60) number of degrees, multiplied by: 0.00034 for oils of 20 degrees Beaumé and under; 0.0004 for oils 21 to 29 degrees, inclusive; 0.00045 for oils 30 to 40 degrees; and 0.0005 for refined oils.

To reduce Baumé gravity to specific gravity, divide 145.88 by 135.88 plus Baumé gravity.

The unit of fuel oil measure is the U. S. barrel of 42 U. S. gallons, which equals 35 imperial gallons.

The following table shows the weight in pounds per barrel and other data for petroleum products of varying specific gravities.

Conversions, Gravities, and Weights for Petroleum Products

[All measurements at 60 degrees F.]

Degrees API gravity	Specific gravity	Gallons per pound	Pounds per gallon	Pounds per barrel	Barrels per short ton	Barrels per metric ton	Barrels per long ton	Cubic feet per long ton
0	1.076	0.1116	8.962	376.40	5.31	5.86	5.95	....
10	1.000	.1201	8.328	349.78	5.71	6.30	6.40	35.9
15	.9659	.1243	8.044	337.85	5.92	6.53	6.63	37.2
18	.9465	.1269	7.882	331.04	6.04	6.66	6.77	38.0
20	.9340	.1286	7.778	326.68	6.12	6.75	6.86	38.5
22	.9218	.1303	7.676	322.39	6.20	6.84	6.95	39.0
24	.9100	.1320	7.578	318.28	6.28	6.93	7.04	39.5
26	.8984	.1337	7.481	314.20	6.37	7.02	7.13	40.1
28	.8871	.1354	7.387	310.25	6.45	7.11	7.22	40.5
30	.8762	.1371	7.296	306.43	6.53	7.19	7.31	41.0
32	.8654	.1388	7.206	302.65	6.61	7.28	7.40	41.6
34	.8550	.1405	7.119	299.00	6.69	7.37	7.49	42.0
36	.8448	.1422	7.034	295.43	6.77	7.46	7.58	42.6
38	.8348	.1439	6.951	291.94	6.85	7.55	7.67	43.1
40	.8251	.1456	6.870	288.54	6.93	7.64	7.76	43.6
42	.8155	.1473	6.790	285.18	7.01	7.73	7.85	44.0
44	.8063	.1490	6.713	281.95	7.09	7.82	7.94	44.6
46	.7972	.1507	6.637	278.75	7.17	7.91	8.04	45.1
48	.7883	.1524	6.563	275.65	7.26	8.00	8.13	45.6
50	.7796	.1541	6.490	272.58	7.34	8.09	8.23	46.1
55	.7587	.1583	6.316	265.27	7.54	8.31	8.44	47.4
60	.7389	.1626	6.151	258.34	7.74	8.53	8.67	48.6
65	.7201	.1668	5.994	251.75	7.94	8.76	8.90	50.0
70	.7022	.1711	5.845	245.49	8.15	8.98	9.12	51.2
75	.6852	.1753	5.703	239.53	8.35	9.20	9.35	52.5
80	.6690	.1796	5.568	233.86	8.55	9.43	9.58	53.7
85	.6536	.1838	5.440	228.48	8.75	9.65	9.80	55.0
90	.6388	.1881	5.316	223.27	8.96	9.87	10.03	56.2
95	.6247	.1924	5.199	218.36	9.16	10.10	10.26	57.5
100	.6112	.1966	5.086	213.61	9.36	10.32	10.49	58.8

SOURCE.—Gravities, gallons per pound, pounds per gallon, National Bureau of Standards; others calculated.

Petroleum Products—Volume Conversions

Unit	U. S. gallons	Imperial gallons	Liters	U. S. barrels	Cubic meters
1 U. S. gallon	1.0	0.833	3.7853	0.0238	0.0038
1 imperial gallon	1.201	1.0	4.546	.0286	.0045
1 liter	.264	.220	1.0	.0063	.0010
1 U. S. barrel	42.0	34.99	158.98	1.0	.159
1 cubic meter	264.1	220.0	1,000.0	6.29	1.0

Number of Gallons Contained in Rectangular Tanks

Size in feet	Depth in feet			Size in feet	Depth in feet		
	3 feet	4 feet	5 feet		3 feet	4 feet	5 feet
6 by 3	336	448	560	10 by 6	1,116	1,488	1,860
6 by 4	447	596	745	10 by 7	1,305	1,740	2,175
6 by 5	558	744	930	10 by 8	1,491	1,918	2,485
6 by 6	672	896	1,120	10 by 9	1,677	2,236	2,795
7 by 4	522	696	870	10 by 10	1,860	2,480	3,105
7 by 5	658	872	1,090	11 by 6	1,233	1,644	2,058
7 by 6	754	1,132	1,290	11 by 7	1,437	1,916	2,390
7 by 7	903	1,200	1,505	11 by 8	1,644	2,192	2,740
8 by 4	597	796	995	11 by 9	1,848	2,464	3,080
8 by 5	744	992	1,240	11 by 10	2,055	2,740	3,425
8 by 6	894	1,192	1,400	11 by 11	2,259	3,012	3,765
8 by 7	1,044	1,392	1,740	12 by 6	1,344	1,792	2,240
8 by 8	1,194	1,592	1,990	12 by 7	1,548	2,064	2,580
9 by 5	840	1,120	1,400	12 by 8	1,788	2,384	2,910
9 by 6	1,008	1,444	1,680	12 by 9	2,016	2,688	3,360
9 by 7	1,176	1,568	1,960	12 by 10	2,282	2,976	3,720
9 by 8	1,341	1,792	2,240	12 by 11	2,466	3,288	4,110
9 by 9	1,512	2,016	2,520	12 by 12	2,688	3,584	4,480

Number of Gallons Contained in Circular Tanks

Diameter	When the depth is—							
	3 feet	4 feet	5 feet	6 feet	7 feet	8 feet	9 feet	10 feet
4 feet	234	312	390	468	546	624	702	780
5 feet	363	484	605	726	847	968	1,089	1,210
6 feet	515	700	875	1,050	1,230	1,400	1,545	1,750
7 feet	720	960	1,200	1,440	1,680	1,920	2,160	2,400
8 feet	933	1,244	1,555	1,866	2,177	2,488	2,799	3,110
9 feet	1,185	1,480	1,975	2,370	2,765	2,960	3,555	3,950
10 feet	1,460	1,952	2,440	2,928	3,416	3,904	4,392	4,880
11 feet	1,776	2,368	2,960	3,552	4,144	4,736	5,326	5,928
12 feet	2,112	2,816	3,520	4,224	4,928	5,632	6,336	7,040

Conversion of Tons into Metric Tons, Kilograms, Pounds, and Poods

Long tons	Metric tons	Kilograms	Pounds	Poods
1	1.0160470432	1,016.0470432	2,240	62.0275
2	2.0320940864	2,032.0940864	4,480	124.0550
3	3.0481411296	3,048.1411296	6,720	186.0825
4	4.0641881728	4,064.1881728	8,960	248.1100
5	5.0802352160	5,080.2352160	11,200	310.1375
6	6.0962822592	6,096.2822592	13,440	372.1650
7	7.1123293024	7,112.3293024	15,680	434.1925
8	8.1283763456	8,128.3763456	17,920	496.2200
9	9.1444233888	9,144.4233888	20,160	558.2475

Metric tons	Long tons	Kilograms	Pounds	Poods
1	0.9842064	1,000	2,204.6223	61.047865
2	1.9684128	2,000	4,409.2446	122.095730
3	2.9526192	3,000	6,613.8669	183.143595
4	3.9368256	4,000	8,818.4892	244.191460
5	4.9210320	5,000	11,023.1115	305.239325
6	5.9052384	6,000	13,227.7338	366.287190
7	6.8894448	7,000	15,432.3561	427.335055
8	7.8736512	8,000	17,636.9784	488.382920
9	8.8578576	9,000	19,841.6007	549.430785

Conversion of Tons into Metric Tons, Kilograms, Pounds, and Poods—Continued

Poods	Long tons	Metric tons	Pounds	Kilograms
1	0.01612188	0.0163805995	36.1130144	16.3805995
2	.03224376	.0327611990	72.2260288	32.7611990
3	.04836564	.0491417985	108.3390432	49.1417985
4	.06448752	.0655223980	144.4520576	65.5223980
5	.08060940	.0819029975	180.5650720	81.9029975
6	.09673128	.0982835970	216.6780864	98.2835970
7	.11285316	.1146641965	252.7911008	114.6641965
8	.12897504	.1310447960	288.9041152	131.0447960
9	.14509692	.1474253955	325.0171296	147.4253955

Kilograms	Metric tons	Long tons	Pounds	Poods
1,000	1	0.9842064	2,204.6223	61.047865
2,000	2	1.9684128	4,409.2446	122.095730
3,000	3	2.9526192	6,613.8669	183.143595
4,000	4	3.9368256	8,818.4892	244.191460
5,000	5	4.9210320	11,023.1115	305.239325
6,000	6	5.9052384	13,227.7338	366.287190
7,000	7	6.8894448	15,432.3561	427.335055
8,000	8	7.8736512	17,636.9784	488.382920
9,000	9	8.8578576	19,841.6007	549.430785

Pounds	Metric tons	Long tons	Kilograms	Poods
1,000	0.45359243	0.4464286	453.59243	27.69085
2,000	.90718486	.8928572	907.18486	55.38170
3,000	1.36077729	1.3392858	1,360.77729	83.07255
4,000	1.81436972	1.7857144	1,814.36972	110.76340
5,000	2.26796215	2.2321430	2,267.96215	138.45425
6,000	2.72155458	2.6785716	2,721.55458	166.14510
7,000	3.17514701	3.1250002	3,175.14701	193.83595
8,000	3.62873944	3.5714288	3,628.73944	221.52680
9,000	4.08233187	4.0178574	4,082.33187	249.21765

AMERICAN CARRIAGE OF GOODS BY SEA ACT, 1936

EFFECTIVE JULY 15, 1936

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled:

That every bill of lading or similar document of title which is evidence of a contract for the carriage of goods by sea to or from ports of the United States, in foreign trade, shall have effect subject to the provisions of this act.

TITLE I

Section 1. When used in this Act—

(a) The term "carrier" includes the owner or the charterer who enters into a contract of carriage with a shipper.

(b) The term "contract of carriage" applies only to contracts of carriage covered by a bill of lading or any similar document of title, insofar as such document relates to the carriage of goods by sea, including any bill of lading or any similar document as aforesaid issued under or pursuant to a charter-party from the moment at which such bill of lading or similar document of title regulates the relations between a carrier and a holder of the same.

(c) The term "goods" includes goods, wares, merchandise, and articles of every kind whatsoever, except live animals and cargo which by the contract of carriage is stated as being carried on deck and is so carried.

(d) The term "ship" means any vessel used for the carriage of goods by sea.

(e) The term "carriage of goods" covers the period from the time when the goods are loaded on to the time when they are discharged from the ship.

RISKS

Sec. 2. Subject to the provisions of section 6, under every contract of carriage of goods by sea, the carrier in relation to the loading, handling, stowage, car-

riage, custody, care, and discharge of such goods, shall be subject to the responsibilities and liabilities and entitled to the rights and immunities hereinafter set forth.

RESPONSIBILITIES AND LIABILITIES

Sec. 3. (1) The carrier shall be bound, before and at the beginning of the voyage, to exercise due diligence to—

(a) Make the ship seaworthy;

(b) Properly man, equip, and supply the ship;

(c) Make the holds, refrigerating and cooling chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage, and preservation.

(2) The carrier shall properly and carefully load, handle, stow, carry, keep, care for, and discharge the goods carried.

(3) After receiving the goods into his charge the carrier, or the master or agent of the carrier, shall, on demand of the shipper, issue to the shipper a bill of lading showing among other things—

(a) The leading marks necessary for identification of the goods as the same are furnished in writing by the shipper before the loading of such goods starts, provided such marks are stamped or otherwise shown clearly upon the goods if uncovered, or on the cases or coverings in which such goods are contained, in such a manner as should ordinarily remain legible until the end of the voyage.

(b) Either the number of packages or pieces, or the quantity or weight, as the case may be, as furnished in writing by the shipper.

(c) The apparent order and condition of the goods:

Provided, That no carrier, master, or agent of the carrier, shall be bound to state or show in the bill of lading any marks, number, quantity, or weight which he has reasonable ground for suspecting not accurately to represent the goods actually received, or which he has had no reasonable means of checking.

(4) Such a bill of lading shall be *prima facie* evidence of the receipt by the carrier of the goods as therein described in accordance with paragraph (3) (a), (b), and (c) of this section:

Provided, That nothing in this Act shall be construed as repealing or limiting the application of any part of the Act, as amended, entitled "An Act relating to bills of lading in interstate and foreign commerce," approved August 29, 1916 (U. S. C., title 49, secs. 81–124), commonly known as the "Pomerene Bills of Lading Act."

(5) The shipper shall be deemed to have guaranteed to the carrier the accuracy at the time of shipment of the marks, number, quantity, and weight, as furnished by him; and the shipper shall indemnify the carrier against all loss, damages, and expenses arising or resulting from inaccuracies in such particulars. The right of the carrier to such indemnity shall in no way limit his responsibility and liability under the contract of carriage to any person other than the shipper.

(6) Unless notice of loss or damage and the general nature of such loss or damage be given in writing to the carrier or his agent at the port of discharge before or at the time of the removal of the goods into the custody of the person entitled to delivery thereof under the contract of carriage, such removal shall be *prima facie* evidence of the delivery by the carrier of the goods as described in the bill of lading.

If the loss or damage is not apparent, the notice must be given within three days of the delivery.

Said notice of loss or damage may be endorsed upon the receipt for the goods given by the person taking delivery thereof.

The notice in writing need not be given if the state of the goods has at the time of their receipt been the subject of joint survey or inspection.

In any event, the carrier and the ship shall be discharged from all liability in respect of loss or damage unless suit is brought within one year after delivery of the goods or the date when the goods should have been delivered:

Provided, That if a notice of loss or damage, either apparent or concealed, is not given as provided for in this section, that fact shall not affect or prejudice the right of the shipper to bring suit within one year after the delivery of the goods or the date when the goods should have been delivered.

In the case of any actual or apprehended loss or damage the carrier and the receiver shall give all reasonable facilities to each other for inspecting and tallying the goods.

(7) After the goods are loaded the bill of lading to be issued by the carrier, master, or agent of the carrier to the shipper shall, if the shipper so demands, be a "shipped" bill of lading:

Provided, That if the shipper shall have previously taken up any document of title to such goods, he shall surrender the same as against the issue of the "shipped" bill of lading, but at the option of the carrier such document of title may be noted at the port of shipment by the carrier, master, or agent with the name or names of the ship or ships upon which the goods have been shipped and the date or dates of shipment, and when so noted the same shall for the purpose of this section be deemed to constitute a "shipped" bill of lading.

(8) Any clause, covenant, or agreement in a contract of carriage relieving the carrier or the ship from liability for loss or damage to or in connection with the goods, arising from negligence, fault, or failure in the duties and obligations provided in this section or lessening such liability otherwise than as provided in this Act, shall be null and void and of no effect.

A benefit of insurance in favor of the carrier, or similar clause, shall be deemed to be a clause relieving the carrier from liability.

RIGHTS AND IMMUNITIES

Sec. 4. (1) Neither the carrier nor the ship shall be liable for loss or damage arising or resulting from unseaworthiness unless caused by want of due diligence on the part of the carrier to make the ship seaworthy, and to secure that the ship is properly manned, equipped, and supplied, and to make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried fit and safe for their reception, carriage, and preservation in accordance with the provisions of paragraph (1) of section 3. Whenever loss or damage has resulted from unseaworthiness, the burden of proving the exercise of due diligence shall be on the carrier or other persons claiming exemption under this section.

(2) Neither the carrier nor the ship shall be responsible for loss or damage arising or resulting from—

(a) Act, neglect, or default of the master, mariner, pilot, or the servants of the carrier in the navigation or in the management of the ship;

(b) Fire, unless caused by the actual fault or privity of the carrier;

(c) Perils, dangers, and accidents of the sea or other navigable waters;

(d) Act of God;

(e) Act of war;

(f) Act of public enemies;

(g) Arrest or restraint of princes, rulers, or people, or seizure under legal process:

(h) Quarantine restrictions;

(i) Act or omission of the shipper or owner of the goods, his agent, or representative;

(j) Strikes or lockouts or stoppage or restraint of labor from whatever cause, whether partial or general: *Provided*, That nothing herein contained shall be construed to relieve a carrier from responsibility for the carrier's own acts;

(k) Riots and civil commotions;

(l) Saving or attempting to save life or property at sea;

(m) Wastage in bulk or weight or any other loss or damage arising from inherent defect, quality, or vice of the goods;

(n) Insufficiency of packing;

(o) Insufficiency or inadequacy of marks;

(p) Latent defects not discoverable by due diligence; and

(q) Any other cause arising without the actual fault and privity of the carrier and without the fault or neglect of the agents or servants of the carrier, but the burden of proof shall be on the person claiming the benefit of this exception to show that neither the actual fault or privity of the carrier nor the fault or neglect of the agents or servants of the carrier contribued to the loss or damage.

(3) The shipper shall not be responsible for loss or damage sustained by the carrier or the ship arising or resulting from any cause without the act, fault, or neglect of the shipper, his agents, or his servants.

(4) Any deviation in saving or attempting to save life or property at sea, or any reasonable deviation shall not be deemed to be an infringement or breach of this Act or the contract of carriage, and the carrier shall not be liable for any loss or damage resulting therefrom:

Provided, however, That if the deviation is for the purpose of loading or unloading cargo or passengers it shall, *prima facie,* be regarded as unreasonable.

(5) Neither the carrier nor the ship shall in any event be or become liable for any loss or damage to or in connection with the transportation of goods in an amount exceeding $500 per package lawful money of the United States, or in case of goods not shipped in packages, per customary freight unit, or the equivalent of that sum in other currency, unless the nature and value of such goods have been declared by the shipper before shipment and inserted in the bill of lading.

This declaration, if embodied in the bill of lading, shall be *prima facie* evidence, but shall not be conclusive on the carrier.

By agreement between the carrier, master, or agent of the carrier and the shipper, another maximum amount than that mentioned in this paragraph may be fixed:

Provided, That such maximum shall not be less than the figure above named. In no event shall the carrier be liable for more than the amount of damage actually sustained.

Neither the carrier nor the ship shall be responsible in any event for loss or damage to or in connection with the transportation of the goods if the nature or value thereof has been knowingly and fraudulently misstated by the shipper in the bill of lading.

(6) Goods of an inflammable, explosive, or dangerous nature to the shipment whereof the carrier, master, or agent of the carrier, has not consented with knowledge of their nature and character, may at any time before discharge be landed at any place or destroyed or rendered innocuous by the carrier without compensation, and the shipper of such goods shall be liable for all damages and expenses directly or indirectly arising out of or resulting from such shipment.

If any such goods shipped with such knowledge and consent shall become a danger to the ship or cargo, they may in like manner be landed at any place, or destroyed or rendered innocuous by the carrier without liability on the part of the carrier except to general average, if any.

SURRENDER OF RIGHTS AND IMMUNITIES AND INCREASE OF RESPONSIBILITIES AND LIABILITIES

Sec. 5. A carrier shall be at liberty to surrender in whole or in part all or any of his rights and immunities or to increase any of his responsibilities and liabilities under this Act, provided such surrender or increase shall be embodied in the bill of lading issued to the shipper.

The provisions of this Act shall not be applicable to charter-parties, but if bills of lading are issued in the case of a ship under a charter-party they shall comply with the terms of this Act.

Nothing in this Act shall be held to prevent the insertion in a bill of lading of any lawful provision regarding general average.

SPECIAL CONDITIONS

Sec. 6. Notwithstanding the provisions of the preceding sections, a carrier, master or agent of the carrier, and a shipper shall, in regard to any particular goods be at liberty to enter into any agreement in any terms as to the responsibility and liability of the carrier for such goods, and as to the rights and immunities of the carrier in respect of such goods, or his obligation as to seaworthiness (so far as the stipulation regarding seaworthiness is not contrary to public policy), or the care or diligence of his servants or agents in regard to the loading, handling, stowage, carriage, custody, care and discharge of the goods carried by sea:

Provided, That in this case no bill of lading has been or shall be issued and that the terms agreed shall be embodied in a receipt which shall be a non-negotiable document and shall be marked as such.

Any agreement so entered into shall have full legal effect:

Provided, That this section shall not apply to ordinary commercial shipments made in the ordinary course of trade but only to other shipments where the character or condition of the property to be carried or the circumstances, terms, and conditions under which the carriage is to be performed are such as reasonably to justify a special agreement.

Sec. 7. Nothing contained in this Act shall prevent a carrier or a shipper from entering into any agreement, stipulation, condition, reservation, or exemp-

tion as to the responsibility and liability of the carrier or the ship for the loss or damage to or in connection with the custody and care and handling of goods prior to the loading on and subsequent to the discharge from the ship on which the goods are carried by sea.

Sec. 8. The provisions of this Act shall not affect the rights and obligations of the carrier under the provisions of the Shipping Act, 1916, or under the provisions of sections 4281 to 4289, inclusive, of the Revised Statutes of the United States, or of any amendments thereto; or under the provisions of any other enactment for the time being in force relating to the limitation of the liability of the owners of seagoing vessels.

TITLE II

Sec. 9. Nothing contained in this Act shall be construed as permitting a common carrier by water to discriminate between competing shippers similarly placed in time and circumstances, either (a) with respect to their right to demand and receive bills of lading subject to the provisions of this Act; or (b) when issuing such bills of lading, either in the surrender of any of the carrier's rights and immunities or in the increase of any of the carrier's responsibilities and liabilities pursuant to section 5, title I, of this Act; or (c) in any other way prohibited by the Shipping Act, 1916, as amended.

Sec. 10. Section 25 of the Interstate Commerce Act is hereby amended by adding the following proviso at the end of paragraph 4 thereof: "*Provided, however,* That insofar as any bill of lading authorized hereunder relates to the carriage of goods by sea, such bill of lading shall be subject to the provisions of the Carriage of Goods by Sea Act."

Sec. 11. Where under the customs of any trade the weight of any bulk cargo inserted in the bill of lading is a weight ascertained or accepted by a third party other than the carrier or the shipper, and the fact that the weight is so ascertained or accepted is stated in the bill of lading, then, notwithstanding anything in this Act, the bill of lading shall not be deemed to be *prima facie* evidence against the carrier of the receipt of goods of the weight so inserted in the bill of lading, and the accuracy thereof at the time of shipment shall not be deemed to have been guaranteed by the shipper.

Sec. 12. Nothing in this Act shall be construed as superseding any part of the (Harter) Act or of any other law which would be applicable in the absence of this Act, insofar as they relate to the duties, responsibilities, and liabilities of the ship or carrier prior to the time when the goods are loaded on or after the time they are discharged from the ship.

Sec. 13. This Act shall apply to all contracts for carriage of goods by sea to or from ports of the United States in foreign trade.

As used in this Act the term "United States" includes its districts, territories, and possessions:

Provided, however, That the Philippine Legislature may by law exclude its application to transportation to or from ports of the Philippine Islands.

The term "foreign trade" means the transportation of goods between the ports of the United States and ports of foreign countries.

Nothing in this Act shall be held to apply to contracts for carriage of goods by sea between any port of the United States or its possessions, and any other port of the United States or its possessions:

Provided, however, That any bill of lading or similar document of title which is evidence of a contract for the carriage of goods by sea between such ports, containing an express statement that it shall be subject to the provisions of this Act, shall be subjected hereto as fully as if subject hereto by the express provisions of this Act:

Provided further, That every bill of lading or similar document of title which is evidence of a contract for the carriage of goods by sea from ports of the United States, in foreign trade, shall contain a statement that it shall have effect subject to the provisions of this Act.

Sec. 14. Upon the certification of the Secretary of Commerce that the foreign commerce of the United States in its competition with that of foreign nations is prejudiced by the provisions, or any of them, of Title I of this Act, or by the laws of any foreign country or countries relating to the carriage of goods by sea, the President of the United States may, from time to time, by proclamation, suspend any or all provisions of Title I of this Act for such periods of time or indefinitely as may be designated in the proclamation. The President may at any time rescind such suspension of Title I hereof, and any provisions

thereof which may have been suspended shall thereby be reinstated and again apply to contracts thereafter made for the carriage of goods by sea. Any proclamation of suspension or rescission of any such suspension shall take effect on a date named therein, which date shall be not less than ten days from the issue of the proclamation.

Any contract for the carriage of goods by sea, subject to the provisions of this Act, effective during any period when Title I hereof, or any part thereof, is suspended, shall be subject to all provisions of law now or hereafter applicable to that part of Title I which may have thus been suspended.

Sec. 15. This Act shall take effect ninety days after the date of its approval, but nothing in this Act shall apply during a period not to exceed 1 year following its approval to any contract for the carriage of goods by sea, made before the date on which this Act is approved, nor to any bill of lading or similar document of title issued, whether before or after such date of approval in pursuance of any such contract as aforesaid.

Sec. 16. This Act may be cited as the "Carriage of Goods by Sea Act."

BRITISH CARRIAGE OF GOODS BY SEA ACT, 1924

An Act to amend the law with respect to the carriage of goods by sea.

Whereas at the International Conference on Maritime Law held at Brussels in October 1922 the delegates at the Conference, including the delegates representing His Majesty, agreed unanimously to recommend their respective Governments to adopt as the basis of a convention a draft convention for the unification of certain rules relating to bills of lading:

And whereas at a meeting held at Brussels in October 1923 the rules contained in the said draft convention were amended by the Committee appointed by the said Conference:

And whereas it is expedient that the said rules as so amended and as set out with modifications in the Schedule to this Act (in this Act referred to as "the Rules") should, subject to the provisions of this Act, be given the force of law with a view to establishing the responsibilities, liabilities, rights and immunities attaching to carriers under bills of lading:

Be it therefore enacted by the King's most Excellent Majesty, by and with the advice and consent of the Lord's Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

1. Subject to the provisions of this Act, the Rules shall have effect in relation to and in connection with the carriage of goods by sea in ships carrying goods from any port in Great Britain or Northern Ireland to any other port whether in or outside Great Britain or Northern Ireland.

2. There shall not be implied in any contract for the carriage of goods by sea to which the Rules apply any absolute undertaking by the carrier of the goods to provide a seaworthy ship.

3. Every bill of lading, or similar document of title, issued in Great Britain or Northern Ireland which contains or is evidence of any contract to which the Rules apply shall contain an express statement that it is to have effect subject to the provisions of the said Rules as applied by this Act.

4. Article VI of the Rules shall, in relation to the carriage of goods by sea in ships carrying goods from any port in Great Britain or Northern Ireland to any other port in Great Britain or Northen Ireland or to a port in the Irish Free State, have effect as though the said Article referred to goods of any class instead of to particular goods and as though the proviso to the second paragraph of the said Article were omitted.

5. Where under the custom of any trade the weight of any bulk cargo inserted in the bill of lading is a weight ascertained or accepted by a third party other than the carrier or the shipper and the fact that the weight is so ascertained or accepted is stated in the bill of lading, then, notwithstanding anything in the Rules, the bill of lading shall not be deemed to be prima facie evidence against the carrier of the receipt of goods of the weight so inserted in the bill of lading, and the accuracy thereof at the time of shipment shall not be deemed to have been guaranteed by the shipper.

6. (1) This Act may be cited as the Carriage of Goods by Sea Act, 1924.

(2) Nothing in this Act shall affect the operation of sections four hundred and forty-six to four hundred and fifty, both inclusive, five hundred and two, and five hundred and three of the Merchant Shipping Act, 1894, as amended by any

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subsequent enactment, or the operation of any other enactment for the time being in force limiting the liability of the owners of seagoing vessels.

(3) The Rules shall not by virtue of this Act apply to any contract for the carriage of goods by sea made before such day, not being earlier than the thirtieth day of June, nineteen hundred and twenty-four, as His Majesty may by Order in Council direct, nor to any bill of lading or similar document of title issued, whether before or after such day as aforesaid, in pursuance of any such contract as aforesaid.

Schedule

Rules Relating to Bills of Lading

Article I—Definitions

In these Rules the following expressions have the meanings hereby assigned to them respectively, that is to say—

(a) "Carrier" includes the owner or the charterer who enters into a contract of carriage with a shipper:

(b) "Contract of carriage" applies only to contracts of carriage covered by a bill of lading or any similar document of title, in so far as such document relates to the carriage of goods by sea, including any bill of lading or any similar document as aforesaid issued under or pursuant to a charter-party from the moment at which such bill of lading or similar document of title regulates the relations between a carrier and a holder of the same:

(c) "Goods" includes goods, wares, merchandise, and articles of every kind whatsoever, except live animals and cargo which by the contract of carriage is stated as being carried on deck and is so carried:

(d) "Ship" means any vessel used for the carriage of goods by sea:

(e) "Carriage of goods" covers the period from the time when the goods are loaded on to the time when they are discharged from the ship.

Article II.—Risks

Subject to the provisions of Article VI, under every contract of carriage of goods by sea the carrier, in relation to the loading, handling, stowage, carriage, custody, care, and discharge of such goods, shall be subject to the responsibilities and liabilities, and entitled to the rights and immunities hereinafter set forth.

Article III.—Responsibilities and Liabilities

1. The carrier shall be bound, before and at the beginning of the voyage, to exercise due diligence to—

(a) Make the ship seaworthy:

(b) Properly man, equip, and supply the ship.

(c) Make the holds, refrigerating and cool chambers, and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation.

2. Subject to the provisions of article IV, the carrier shall properly and carefully load, handle, stow, carry, keep, care for and discharge the goods carried.

3. After receiving the goods into his charge, the carrier, or the master or agent of the carrier, shall, on demand of the shipper, issue to the shipper a bill of lading showing among other things—

(a) The leading marks necessary for identification of the goods as the same are furnished in writing by the shipper before the loading of such goods starts, provided such marks are stamped or otherwise shown clearly upon the goods if uncovered, or on the cases or coverings in which such goods are contained, in such a manner as should ordinarily remain legible until the end of the voyage;

(b) Either the number of packages or pieces, or the quantity, or weight as the case may be, as furnished in writing by the shipper:

(c) The apparent order and condition of the goods:

Provided, That no carrier, master or agent of the carrier, shall be bound to state or show in the bill of lading any marks, number, quantity, or weight which he has reasonable ground for suspecting not accurately to represent the goods actually received, or which he has had no reasonable means of checking.

4. Such a bill of lading shall be prima facie evidence of the receipt by the carrier of the goods as therein described in accordance with paragraph 3 (a), (b), and (c).

5. The shipper shall be deemed to have guaranteed to the carrier the accuracy at the time of shipment of the marks, number, quantity, and weight, as furnished by him, and the shipper shall indemnify the carrier against all loss, damages, and expenses arising or resulting from inaccuracies in such particulars. The right of the carrier to such indemnity shall in no way limit his responsibility and liability under the contract of carriage to any person other than the shipper.

6. Unless notice of loss or damage and the general nature of such loss or damage be given in writing to the carrier or his agent at the port of discharge before or at the time of the removal of the goods into the custody of the person entitled to delivery thereof under the contract of carriage, or, if the loss or damage be not apparent, within three days, such removal shall be prima facie evidence of the delivery by the carrier of the goods as described in the bill of lading.

The notice in writing need not be given if the state of the goods has at the time of their receipt been the subject of joint survey or inspection.

In any event the carrier and the ship shall be discharged from all liability in respect of loss or damage unless suit is brought within one year after delivery of the goods or the date when the goods should have been delivered.

In the case of any actual or apprehended loss or damage the carrier and the receiver shall give all reasonable facilities to each other for inspecting and tallying the goods.

7. After the goods are loaded the bill of lading to be issued by the carrier, master or agent of the carrier, to the shipper shall, if the shipper so demands, be a "shipped" bill of lading, provided that if the shipper shall have previously taken up any document of title to such goods, he shall surrender the same as against the issue of the "shipped" bill of lading, but at the option of the carrier such document of title may be noted at the port of shipment by the carrier, master, or agent with the name or names of the ship or ships upon which the goods have been shipped and the date or dates of shipment, and when so noted the same shall for the purpose of this Article be deemed to constitute a "shipped" bill of lading.

8. Any clause, covenant, or agreement in a contract of carriage relieving the carrier or the ship from liability for loss or damage to or in connection with goods arising from negligence, fault or failure in the duties and obligations provided in this Article or lessening such liability otherwise than as provided in these Rules, shall be null and void and of no effect.

A benefit of insurance or similar clause shall be deemed to be a clause relieving the carrier from liability.

Article IV—Rights and Immunities

1. Neither the carrier nor the ship shall be liable for loss or damage arising or resulting from unseaworthiness unless caused by want of due diligence on the part of the carrier to make the ship seaworthy, and to secure that the ship is properly manned, equipped and supplied, and to make the holds, refrigerating and cool chambers and all other parts of the ship in which goods are carried fit and safe for their reception, carriage and preservation in accordance with the provisions of paragraph 1 of Article III.

Whenever loss or damage has resulted from unseaworthiness, the burden of proving the exercise of due diligence shall be on the carrier or other person claiming exemption under this section.

2. Neither the carrier nor the ship shall be responsible for loss or damage arising or resulting from—

(a) Act, neglect, or default of the master, mariner, pilot, or the servants of the carrier in the navigation or in the management of the ship:

(b) Fire, unless caused by the actual fault or privity of the carrier;

(c) Perils, dangers, and accidents of the sea or other navigable waters;

(d) Act of God;

(e) Act of war;

(f) Act of public enemies;

(g) Arrest or restraint of princes, rulers or people, or seizure under legal process;

(h) Quarantine restrictions;

(i) Act or omission of the shipper or owner of the goods, his agent or representative;

(j) Strikes or lock-outs or stoppage or restraint of labour from whatever cause, whether partial or general;

(k) Riots and civil commotions;

(l) Saving or attempting to save life or property at sea;

(m) Wastage in bulk or weight or any other loss or damage arising from inherent defect, quality, or vice of the goods;

(n) Insufficiency of packing;

(o) Insufficiency or inadequacy of marks;

(p) Latent defects not discoverable by due diligence;

(q) Any other cause arising without the actual fault or privity of the carrier, or without the fault or neglect of the agents or servants of the carrier, but the burden of proof shall be on the person claiming the benefit of this exception to show that neither the actual fault or privity of the carrier nor the fault or neglect of the agents or servants of the carrier contributed to the loss or damage.

3. The shipper shall not be responsible for loss or damage sustained by the carrier or the ship arising or resulting from any cause without the act, fault, or neglect of the shipper, his agents, or his servants.

4. Any deviation in saving or attempting to save life or property at sea, or any reasonable deviation shall not be deemed to be an infringement or breach of these Rules or of the contract of carriage, and the carrier shall not be liable for any loss or damage resulting therefrom.

5. Neither the carrier nor the ship shall in any event be or become liable for any loss or damage to or in connection with goods in an amount exceeding £100 per package or unit, or the equivalent of that sum in other currency, unless the nature and value of such goods have been declared by the shipper before shipment and inserted in the bill of lading.

This declaration if embodied in the bill of lading shall be prima facie evidence, but shall not be binding or conclusive on the carrier.

By agreement between the carrier, master, or agent of the carrier and the shipper another maximum amount than that mentioned in this paragraph may be fixed, provided that such maximum shall not be less than the figure above named.

Neither the carrier nor the ship shall be responsible in any event for loss or damage to or in connection with goods if the nature or value thereof has been knowingly misstated by the shipper in the bill of lading.

6. Goods of an inflammable, explosive, or dangerous nature to the shipment whereof the carrier, master, or agent of the carrier has not consented, with knowledge of their nature and character, may at any time before discharge be landed at any place or destroyed or rendered innocuous by the carrier without compensation, and the shipper of such goods shall be liable for all damages and expenses directly or indirectly arising out of or resulting from such shipment.

If any such goods shipped with such knowledge and consent shall become a danger to the ship or cargo, they may in like manner be landed at any place or destroyed or rendered innocuous by the carrier without liability on the part of the carrier except to general average, if any.

Article V.—Surrender of Rights and Immunities and Increase of Responsibilities and Liabilities

A carrier shall be at liberty to surrender in whole or in part all or any of his rights and immunities or to increase any of his responsibilities and liabilities under the Rules contained in any of these Articles, provided such surrender or increase shall be embodied in the bill of lading issued to the shipper.

The provisions of these Rules shall not be applicable to charter-parties, but if bills of lading are issued in the case of a ship under a charter-party they shall comply with the terms of these Rules. Nothing in these Rules shall be held to prevent the insertion in a bill of lading of any lawful provision regarding general average.

Article VI.—Special Conditions

Notwithstanding the provisions of the preceding Articles, a carrier, master, or agent of the carrier, and a shipper shall in regard to any particular goods be at liberty to enter into any agreement in any terms as to the responsibility and liability of the carrier for such goods, and as to the rights and immunities of the carrier in respect of such goods, or his obligation as to seaworthiness, so far as this stipulation is not contrary to public policy, or the care or diligence of his servants or agents in regard to the loading, handling, stowage, carriage, custody, care, and discharge of the goods carried by sea, provided that in this case no bill of lading has been or shall be issued and that the terms agreed shall

be embodied in a receipt which shall be a non-negotiable document and shall be marked as such.

Any agreement so entered into shall have full legal effect:

Provided, That this Article shall not apply to ordinary commercial shipments made in the ordinary course of trade, but only to other shipments where the character or condition of the property to be carried or the circumstances, terms, and conditions under which the carriage is to be performed, are such as reasonably to justify a special agreement.

Article VII.—Limitations on the Application of the Rules

Nothing herein contained shall prevent a carrier or a shipper from entering into any agreement, stipulation, condition, reservation, or exemption as to the responsibility and liability of the carrier or the ship for the loss or damage to or in connection with the custody and care and handling of goods prior to the loading on and subsequent to the discharge from the ship on which the goods are carried by sea.

Article VIII.—Limitation of Liability

The provisions of these Rules shall not affect the rights and obligations of the carrier under any statute for the time being in force relating to the limitation of the liability of owners of sea-going vessels.

Article IX

The monetary units mentioned in these Rules are to be taken to be gold value.

CANADIAN WATER CARRIAGE OF GOODS ACT, 1936

WHICH CAME INTO FORCE ON AUGUST 1, 1936

1. This Act may be cited as the Water Carriage of Goods Act, 1936.

2. Subject to the provisions of this Act, the Rules relating to bills of lading as contained in the Schedule to this Act (hereinafter referred to as "the Rules") shall have effect in relation to and in connection with the carriage of goods by water in ships carrying goods from any port in Canada to any other port whether in or outside Canada.

3. There shall not be implied in any contract for the carriage of goods by water to which the Rules apply any absolute undertaking by the carrier of the goods to provide a seaworthy ship.

4. Every bill of lading, or similar document of title issued in Canada which contains or is evidence of any contract to which the rules apply shall contain an express statement that it is to have effect subject to the provisions of the Rules as applied by this Act.

5. Article VI of the Rules shall, in relation to the carriage of goods by water in ships carrying goods from any port or place in Canada to any other port or place in Canada, have effect as though the said Article referred to goods of any class instead of to particular goods and as though the proviso to the second paragraph of the said Article were omitted.

6. Where under the custom of any trade the weight of any bulk cargo inserted in the bill of lading is a weight ascertained or accepted by a third party other than the carrier or the shipper, and the fact that the weight is so ascertained or accepted is stated in the bill of lading, then, notwithstanding anything in the Rules, the bill of lading shall not be deemed to be prima facie evidence against the carrier of the receipt of goods of the weight so inserted in the bill of lading, and the accuracy thereof at the time of shipment shall not be deemed to have been guaranteed by the shipper.

7. (*1*) Nothing in this Act shall affect the operation of Secs. 456, 457, 649–658, of the Canada Shipping Act, 1934, as amended, or the operation of any other enactment for the time being in force limiting the liability of the owners of vessels.

(*2*) The Rules shall not by virtue of this Act apply to any contract for the carriage of goods by water made before such day, not being earlier than August

1, 1936, as the Governor General may by Order in Council direct, nor to any bill of lading or similar document of title issued, whether before or after such day as aforesaid, in pursuance of any such contract as aforesaid.

8. The Water Carriage of Goods Act, 1927, is hereby repealed.

AUSTRALIAN SEA CARRIAGE OF GOODS ACT, 1924

The Australian Sea Carriage of Goods Act, 1904, has been repealed, and a new measure of the same name enacted in its place. The schedule of the new Act is identical in wording with the British Carriage of Goods by Sea Act, 1924, but the preliminary portion is somewhat different, there being special clauses dealing with "received for shipment bills of lading," and the ousting of the jurisdiction of the Australian courts provided for in certain foreign bills of lading.

THE HARTER ACT

ACT OF CONGRESS, APPROVED FEBRUARY 13, 1893

An Act relating to navigation of vessels, bills of lading, and to certain obligations, duties, and rights in connection with the carriage of property.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Section 1. That is shall not be lawful for the manager, agent, master or owner of any vessel transporting merchandise or property from or between ports of the United States and foreign ports to insert in any bill of lading or shipping document any clause, covenant, or agreement whereby it, he, or they shall be relieved from liability for loss or damage arising from negligence, fault, or failure in proper loading, stowage, custody, care, or proper delivery of any and all lawful merchandise or property committed to its or their charge. Any and all words or clauses of such import inserted in bills of lading or shipping receipts shall be null and void and of no effect.

Sec. 2. That it shall not be lawful for any vessel transporting merchandise or property from or between ports of the United States of America and foreign ports, her owner, master, agent or manager to insert in any bill of lading or shipping document any covenant or agreement whereby the obligations of the owner or owners of said vessel to exercise due diligence, properly equip, man, provision, and outfit said vessel, and to make said vessel seaworthy and capable of performing her intended voyage, or whereby the obligations of the master, officers, agents, or servants to carefully handle and stow her cargo and to care for and properly deliver same, shall in any wise be lessened, weakened, or avoided.

Sec. 3. That if the owner of any vessel transporting merchandise or property to or from any port in the United States of America shall exercise due diligence to make the said vessel in all respects seaworthy and properly manned, equipped, and supplied, neither the vessel, nor owners, agents, or charterers shall become or be held responsible for damage or loss resulting from faults or errors in navigation or in the management of said vessel, nor shall the vessel, her owner or owners, charterers, agent, or master be held liable for losses arising from dangers of the sea or other navigable waters, acts of God, or public enemies, or the inherent defect, quality, or vice of the thing carried, or from insufficiency of package, or seizure under legal process, or for loss resulting from any act or omission of the shipper or owner of the goods, his agent or representative, or from saving or attempting to save life or property at sea, or from any deviation in rendering such service.

Sec. 4. That it shall be the duty of the owner or owners, master, or agent of any vessel transporting merchandise or property from or between ports of the United States and foreign ports to issue to shippers of any lawful merchandise a bill of lading, or shipping document, stating among other things, the marks necessary for identification, number of packages, or quantity, stating whether it be carrier's or shipper's weight, and apparent order or condition of such merchandise or property delivered to and received by the owner, master, or agent of the vessel for transportation, and such document shall be prima facie evidence of the receipt of the merchandise therein described.

Sec. 5. That for a violation of any of the provisions of this Act the agent, owner, or master of the vessel guilty of such violation, and who refuses to issue on demand the bill of lading herein provided for, shall be liable to a fine not exceeding two thousand dollars. The amount of the fine and costs for such vio-

lation shall be a lien upon the vessel, whose agent, owner, or master is guilty of such violation, and such vessel may be libeled therefor in any district court of the United States, within whose jurisdiction the vessel may be found. One-half of such penalty shall go to the party injured by such violation and the remainder to the Government of the United States.

Sec. 6. That this Act shall not be held to modify or repeal sections forty-two hundred and eighty-one, forty-two hundred and eighty-two, and forty-two hundred and eighty-three of the Revised Statutes of the United States, or any other statute defining the liability of vessels, their owners, or representatives.

Sec. 7. Sections one and four of this Act shall not apply to the transportation of live animals.

Sec. 8. That this Act shall take effect from and after the first day of July, eighteen hundred and ninety-three.

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